

# **Stormwater Management System Report**

**LOGAL, LLC**

**PROPOSED SITE IMPROVEMENTS**

**100 DUCHAINE BOULEVARD  
NEW BEDFORD, MASSACHUSETTS**

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Project No. 1998

**FIELD**  
**ENGINEERING CO., INC.**  
CONSULTING ENGINEERS

## *Preface*

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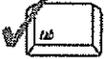
### *Stormwater Management Standards Compliance Checklist*



# Checklist for Stormwater Report

## A. Introduction

**Important:** When filling out forms on the computer, use only the tab key to move your cursor - do not use the return key.



A Stormwater Report must be submitted with the Notice of Intent permit application to document compliance with the Stormwater Management Standards. The following checklist is NOT a substitute for the Stormwater Report (which should provide more substantive and detailed information) but is offered here as a tool to help the applicant organize their Stormwater Management documentation for their Report and for the reviewer to assess this information in a consistent format. As noted in the Checklist, the Stormwater Report must contain the engineering computations and supporting information set forth in Volume 3 of the Massachusetts Stormwater Handbook. The Stormwater Report must be prepared and certified by a Registered Professional Engineer (RPE) licensed in the Commonwealth.

The Stormwater Report must include:

- The Stormwater Checklist completed and stamped by a Registered Professional Engineer (see page 2) that certifies that the Stormwater Report contains all required submittals.<sup>1</sup> This Checklist is to be used as the cover for the completed Stormwater Report.
- Applicant/Project Name
- Project Address
- Name of Firm and Registered Professional Engineer that prepared the Report
- Long-Term Pollution Prevention Plan required by Standards 4-6
- Construction Period Pollution Prevention and Erosion and Sedimentation Control Plan required by Standard 8<sup>2</sup>
- Operation and Maintenance Plan required by Standard 9

In addition to all plans and supporting information, the Stormwater Report must include a brief narrative describing stormwater management practices, including environmentally sensitive site design and LID techniques, along with a diagram depicting runoff through the proposed BMP treatment train. Plans are required to show existing and proposed conditions, identify all wetland resource areas, NRCS soil types, critical areas, Land Uses with Higher Potential Pollutant Loads (LUHPPL), and any areas on the site where infiltration rate is greater than 2.4 inches per hour. The Plans shall identify the drainage areas for both existing and proposed conditions at a scale that enables verification of supporting calculations.

As noted in the Checklist, the Stormwater Management Report shall document compliance with each of the Stormwater Management Standards as provided in the Massachusetts Stormwater Handbook. The soils evaluation and calculations shall be done using the methodologies set forth in Volume 3 of the Massachusetts Stormwater Handbook.

To ensure that the Stormwater Report is complete, applicants are required to fill in the Stormwater Report Checklist by checking the box to indicate that the specified information has been included in the Stormwater Report. If any of the information specified in the checklist has not been submitted, the applicant must provide an explanation. The completed Stormwater Report Checklist and Certification must be submitted with the Stormwater Report.

<sup>1</sup> The Stormwater Report may also include the Illicit Discharge Compliance Statement required by Standard 10. If not included in the Stormwater Report, the Illicit Discharge Compliance Statement must be submitted prior to the discharge of stormwater runoff to the post-construction best management practices.

<sup>2</sup> For some complex projects, it may not be possible to include the Construction Period Erosion and Sedimentation Control Plan in the Stormwater Report. In that event, the issuing authority has the discretion to issue an Order of Conditions that approves the project and includes a condition requiring the proponent to submit the Construction Period Erosion and Sedimentation Control Plan before commencing any land disturbance activity on the site.



# Checklist for Stormwater Report

## B. Stormwater Checklist and Certification

The following checklist is intended to serve as a guide for applicants as to the elements that ordinarily need to be addressed in a complete Stormwater Report. The checklist is also intended to provide conservation commissions and other reviewing authorities with a summary of the components necessary for a comprehensive Stormwater Report that addresses the ten Stormwater Standards.

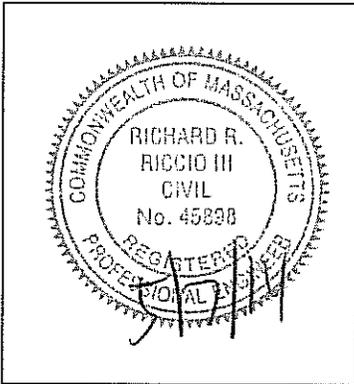
*Note:* Because stormwater requirements vary from project to project, it is possible that a complete Stormwater Report may not include information on some of the subjects specified in the Checklist. If it is determined that a specific item does not apply to the project under review, please note that the item is not applicable (N.A.) and provide the reasons for that determination.

A complete checklist must include the Certification set forth below signed by the Registered Professional Engineer who prepared the Stormwater Report.

### Registered Professional Engineer's Certification

I have reviewed the Stormwater Report, including the soil evaluation, computations, Long-term Pollution Prevention Plan, the Construction Period Erosion and Sedimentation Control Plan (if included), the Long-term Post-Construction Operation and Maintenance Plan, the Illicit Discharge Compliance Statement (if included) and the plans showing the stormwater management system, and have determined that they have been prepared in accordance with the requirements of the Stormwater Management Standards as further elaborated by the Massachusetts Stormwater Handbook. I have also determined that the information presented in the Stormwater Checklist is accurate and that the information presented in the Stormwater Report accurately reflects conditions at the site as of the date of this permit application.

Registered Professional Engineer Block and Signature



*[Handwritten Signature]*  
Signature and Date

5/7/14

### Checklist

**Project Type:** Is the application for new development, redevelopment, or a mix of new and redevelopment?

- New development
- Redevelopment
- Mix of New Development and Redevelopment



# Checklist for Stormwater Report

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## Checklist (continued)

**LID Measures:** Stormwater Standards require LID measures to be considered. Document what environmentally sensitive design and LID Techniques were considered during the planning and design of the project:

- No disturbance to any Wetland Resource Areas
- Site Design Practices (e.g. clustered development, reduced frontage setbacks)
- Reduced Impervious Area (Redevelopment Only) (Note: Within 100-foot Buffer Zone)
- Minimizing disturbance to existing trees and shrubs
- LID Site Design Credit Requested:
  - Credit 1
  - Credit 2
  - Credit 3
- Use of "country drainage" versus curb and gutter conveyance and pipe
- Bioretention Cells (includes Rain Gardens)
- Constructed Stormwater Wetlands (includes Gravel Wetlands designs)
- Treebox Filter
- Water Quality Swale
- Grass Channel
- Green Roof
- Other (describe): \_\_\_\_\_

### Standard 1: No New Untreated Discharges

- No new untreated discharges
- Outlets have been designed so there is no erosion or scour to wetlands and waters of the Commonwealth
- Supporting calculations specified in Volume 3 of the Massachusetts Stormwater Handbook included.



# Checklist for Stormwater Report

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## Checklist (continued)

### Standard 2: Peak Rate Attenuation

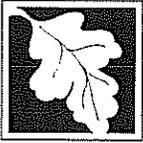
- Standard 2 waiver requested because the project is located in land subject to coastal storm flowage and stormwater discharge is to a wetland subject to coastal flooding.
- Evaluation provided to determine whether off-site flooding increases during the 100-year 24-hour storm.
- Calculations provided to show that post-development peak discharge rates do not exceed pre-development rates for the 2-year and 10-year 24-hour storms. If evaluation shows that off-site flooding increases during the 100-year 24-hour storm, calculations are also provided to show that post-development peak discharge rates do not exceed pre-development rates for the 100-year 24-hour storm.

### Standard 3: Recharge (N/A as we have an overall reduction in impervious area on site)

- Soil Analysis provided.
- Required Recharge Volume calculation provided.
- Required Recharge volume reduced through use of the LID site Design Credits.
- Sizing the infiltration, BMPs is based on the following method: Check the method used.
  - Static
  - Simple Dynamic
  - Dynamic Field<sup>1</sup>
- Runoff from all impervious areas at the site discharging to the infiltration BMP.
- Runoff from all impervious areas at the site is *not* discharging to the infiltration BMP and calculations are provided showing that the drainage area contributing runoff to the infiltration BMPs is sufficient to generate the required recharge volume.
- Recharge BMPs have been sized to infiltrate the Required Recharge Volume.
- Recharge BMPs have been sized to infiltrate the Required Recharge Volume *only* to the maximum extent practicable for the following reason:
  - Site is comprised solely of C and D soils and/or bedrock at the land surface
  - M.G.L. c. 21E sites pursuant to 310 CMR 40.0000
  - Solid Waste Landfill pursuant to 310 CMR 19.000
  - Project is otherwise subject to Stormwater Management Standards only to the maximum extent practicable.
- Calculations showing that the infiltration BMPs will drain in 72 hours are provided.
- Property includes a M.G.L. c. 21E site or a solid waste landfill and a mounding analysis is included.

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<sup>1</sup> 80% TSS removal is required prior to discharge to infiltration BMP if Dynamic Field method is used.



# Checklist for Stormwater Report

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## Checklist (continued)

### Standard 3: Recharge (continued)

- The infiltration BMP is used to attenuate peak flows during storms greater than or equal to the 10-year 24-hour storm and separation to seasonal high groundwater is less than 4 feet and a mounding analysis is provided.
- Documentation is provided showing that infiltration BMPs do not adversely impact nearby wetland resource areas.

### Standard 4: Water Quality

The Long-Term Pollution Prevention Plan typically includes the following:

- Good housekeeping practices;
  - Provisions for storing materials and waste products inside or under cover;
  - Vehicle washing controls;
  - Requirements for routine inspections and maintenance of stormwater BMPs;
  - Spill prevention and response plans;
  - Provisions for maintenance of lawns, gardens, and other landscaped areas;
  - Requirements for storage and use of fertilizers, herbicides, and pesticides;
  - Pet waste management provisions;
  - Provisions for operation and management of septic systems;
  - Provisions for solid waste management;
  - Snow disposal and plowing plans relative to Wetland Resource Areas;
  - Winter Road Salt and/or Sand Use and Storage restrictions;
  - Street sweeping schedules;
  - Provisions for prevention of illicit discharges to the stormwater management system;
  - Documentation that Stormwater BMPs are designed to provide for shutdown and containment in the event of a spill or discharges to or near critical areas or from LUHPPL;
  - Training for staff or personnel involved with implementing Long-Term Pollution Prevention Plan;
  - List of Emergency contacts for implementing Long-Term Pollution Prevention Plan.
- A Long-Term Pollution Prevention Plan is attached to Stormwater Report and is included as an attachment to the Wetlands Notice of Intent.
  - Treatment BMPs subject to the 44% TSS removal pretreatment requirement and the one inch rule for calculating the water quality volume are included, and discharge:
    - is within the Zone II or Interim Wellhead Protection Area
    - is near or to other critical areas
    - is within soils with a rapid infiltration rate (greater than 2.4 inches per hour)
    - involves runoff from land uses with higher potential pollutant loads.
  - The Required Water Quality Volume is reduced through use of the LID site Design Credits.
  - Calculations documenting that the treatment train meets the 80% TSS removal requirement and, if applicable, the 44% TSS removal pretreatment requirement, are provided.



# Checklist for Stormwater Report

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## Checklist (continued)

### Standard 4: Water Quality (continued)

- The BMP is sized (and calculations provided) based on:
  - The ½" or 1" Water Quality Volume or
  - The equivalent flow rate associated with the Water Quality Volume and documentation is provided showing that the BMP treats the required water quality volume.
- The applicant proposes to use proprietary BMPs, and documentation supporting use of proprietary BMP and proposed TSS removal rate is provided. This documentation may be in the form of the proprietary BMP checklist found in Volume 2, Chapter 4 of the Massachusetts Stormwater Handbook and submitting copies of the TARP Report, STEP Report, and/or other third party studies verifying performance of the proprietary BMPs.
- A TMDL exists that indicates a need to reduce pollutants other than TSS and documentation showing that the BMPs selected are consistent with the TMDL is provided.

### Standard 5: Land Uses With Higher Potential Pollutant Loads (LUHPPLs) NOT APPLICABLE

- The NPDES Multi-Sector General Permit covers the land use and the Stormwater Pollution Prevention Plan (SWPPP) has been included with the Stormwater Report.
- The NPDES Multi-Sector General Permit covers the land use and the SWPPP will be submitted *prior* to the discharge of stormwater to the post-construction stormwater BMPs.
- The NPDES Multi-Sector General Permit does *not* cover the land use.
- LUHPPLs are located at the site and industry specific source control and pollution prevention measures have been proposed to reduce or eliminate the exposure of LUHPPLs to rain, snow, snow melt and runoff, and been included in the long term Pollution Prevention Plan.
- All exposure has been eliminated.
- All exposure has *not* been eliminated and all BMPs selected are on MassDEP LUHPPL list.
- The LUHPPL has the potential to generate runoff with moderate to higher concentrations of oil and grease (e.g. all parking lots with >1000 vehicle trips per day) and the treatment train includes an oil grit separator, a filtering bioretention area, a sand filter or equivalent.

### Standard 6: Critical Areas NOT APPLICABLE

- The discharge is near or to a critical area and the treatment train includes only BMPs that MassDEP has approved for stormwater discharges to or near that particular class of critical area.
- Critical areas and BMPs are identified in the Stormwater Report.



# Checklist for Stormwater Report

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## Checklist (continued)

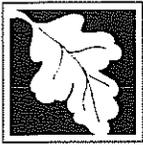
### Standard 7: Redevelopments and Other Projects Subject to the Standards only to the maximum extent practicable

- The project is subject to the Stormwater Management Standards only to the maximum Extent Practicable as a:
  - Limited Project
  - Small Residential Projects: 5-9 single family houses or 5-9 units in a multi-family development provided there is no discharge that may potentially affect a critical area.
  - Small Residential Projects: 2-4 single family houses or 2-4 units in a multi-family development with a discharge to a critical area
  - Marina and/or boatyard provided the hull painting, service and maintenance areas are protected from exposure to rain, snow, snow melt and runoff
  - Bike Path and/or Foot Path
- Redevelopment Project
- Redevelopment portion of mix of new and redevelopment.
- Certain standards are not fully met (Standard No. 1, 8, 9, and 10 must always be fully met) and an explanation of why these standards are not met is contained in the Stormwater Report.
- The project involves redevelopment and a description of all measures that have been taken to improve existing conditions is provided in the Stormwater Report. The redevelopment checklist found in Volume 2 Chapter 3 of the Massachusetts Stormwater Handbook may be used to document that the proposed stormwater management system (a) complies with Standards 2, 3 and the pretreatment and structural BMP requirements of Standards 4-6 to the maximum extent practicable and (b) improves existing conditions.

### Standard 8: Construction Period Pollution Prevention and Erosion and Sedimentation Control

A Construction Period Pollution Prevention and Erosion and Sedimentation Control Plan must include the following information:

- Narrative;
  - Construction Period Operation and Maintenance Plan;
  - Names of Persons or Entity Responsible for Plan Compliance;
  - Construction Period Pollution Prevention Measures;
  - Erosion and Sedimentation Control Plan Drawings;
  - Detail drawings and specifications for erosion control BMPs, including sizing calculations;
  - Vegetation Planning;
  - Site Development Plan;
  - Construction Sequencing Plan;
  - Sequencing of Erosion and Sedimentation Controls;
  - Operation and Maintenance of Erosion and Sedimentation Controls;
  - Inspection Schedule;
  - Maintenance Schedule;
  - Inspection and Maintenance Log Form.
- A Construction Period Pollution Prevention and Erosion and Sedimentation Control Plan containing the information set forth above has been included in the Stormwater Report.



# Checklist for Stormwater Report

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## Checklist (continued)

### Standard 8: Construction Period Pollution Prevention and Erosion and Sedimentation Control (continued)

- The project is highly complex and information is included in the Stormwater Report that explains why it is not possible to submit the Construction Period Pollution Prevention and Erosion and Sedimentation Control Plan with the application. A Construction Period Pollution Prevention and Erosion and Sedimentation Control has **not** been included in the Stormwater Report but will be submitted **before** land disturbance begins.
- The project is **not** covered by a NPDES Construction General Permit.
- The project is covered by a NPDES Construction General Permit and a copy of the SWPPP is in the Stormwater Report.
- The project is covered by a NPDES Construction General Permit but no SWPPP been submitted. The SWPPP will be submitted BEFORE land disturbance begins.

### Standard 9: Operation and Maintenance Plan

- The Post Construction Operation and Maintenance Plan is included in the Stormwater Report and includes the following information:
  - Name of the stormwater management system owners;
  - Party responsible for operation and maintenance;
  - Schedule for implementation of routine and non-routine maintenance tasks;
  - Plan showing the location of all stormwater BMPs maintenance access areas;
  - Description and delineation of public safety features;
  - Estimated operation and maintenance budget; and
  - Operation and Maintenance Log Form.
- The responsible party is **not** the owner of the parcel where the BMP is located and the Stormwater Report includes the following submissions:
  - A copy of the legal instrument (deed, homeowner's association, utility trust or other legal entity) that establishes the terms of and legal responsibility for the operation and maintenance of the project site stormwater BMPs;
  - A plan and easement deed that allows site access for the legal entity to operate and maintain BMP functions.

### Standard 10: Prohibition of Illicit Discharges

- The Long-Term Pollution Prevention Plan includes measures to prevent illicit discharges;
- An Illicit Discharge Compliance Statement is attached;
- NO Illicit Discharge Compliance Statement is attached but will be submitted **prior to** the discharge of any stormwater to post-construction BMPs.

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# *Section 1*

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## *Hydrologic Overview*

## 1.0 INTRODUCTION

### 1.1 Project Description

The applicant is proposing to perform a number of site improvements at an existing facility located at 100 Duchaine Boulevard in the New Bedford Business Park. These improvements include the construction of 16 loading docks along the southern side of an existing 92,400 +/- S.F building and a 49,000 +/- S.F gravel tractor trailer parking area west of the building. The project will also consist of other improvements such as an 18' wide gravel driveway that will connect the loading dock to the gravel parking area, 15 paved parking spaces with an ADA ramp and concrete sidewalk, and constructing a new paved access to the loading dock area along with other minor, miscellaneous improvement to accommodate the proposed construction. The project is considered a redevelopment project based on the definition stated in the MassDEP Stormwater Handbook. New stormwater management facilities will be constructed throughout the property for the treatment and attenuation of runoff generated by the project. The existing utilities will remain in service during (and following) construction. Other developed portions of the site that are not the subject of the proposed site improvements of this project will remain unchanged from their pre-developed conditions.

The new paved (and gravel) surfaces on the site will be serviced by an on-site stormwater management system consisting of a combination of grassed swales and surface bio-retention areas for pollutant removal and attenuation prior to discharge to the various wetland areas. The stormwater management system has been designed to accept and treat the projected stormwater flows from development in accordance with the current DEP Stormwater Management Standards. As part of the new DEP Stormwater Management Standards and Regulations, the DEP is requiring Low Impact Development (LID) measures to be considered in the design of the project. The project, as proposed, does make use of certain LID measures including the bio-retention areas being proposed around the site

In the present condition, the site supports a number of wetland resource areas as defined in the Wetlands Protection Act and 310 CMR 10.00 located around the property. The specific resource areas specific to the subject parcel are as follows:

- Bordering Vegetated Wetland

### 1.2 Hydrologic Overview

A hydrologic analysis for the pre and post developed conditions for the project site has been prepared and is submitted in the following sections of this report. The primary goal of this analysis is to evaluate and mitigate the potential impacts of the proposed development to the adjacent properties, roadway drainage systems, and on-site wetland resource areas. Particular consideration has been given to stormwater quantity and quality at the existing bordering vegetated wetland systems surrounding the project. In its current condition, the project site does not have any substantial stormwater management BMP's servicing the impervious surfaces. One goal of the stormwater management system design was to provide an improvement to the treatment and attenuation of the runoff being produced by the existing impervious surfaces on the site, particularly towards the on-site bordering vegetated wetland systems and adjacent properties.

The analysis of the present condition and the proposed condition hydrology includes a calculated estimation of the runoff volume and peak storm flow rates from the site for each individual drainage area. The HydroCAD hydrologic program, developed by Applied Microcomputer Systems, was utilized in the preparation of the stormwater runoff models. The HydroCAD software is based upon the Soil Conservation Service, "Technical Release 20 – Urban Hydrology for Small Watersheds" and is a generally accepted industry standard methodology.

An analysis was performed for the 2, 10, 25, and 100-year frequency rainfall events. These events were based on a 24-hour duration storm with a SCS Type III storm distribution curve. Time of Concentration (Tc) values and runoff curve numbers (CN) were developed for each of the calculated existing and proposed drainage areas based upon prevalent topographic patterns, ground cover conditions, and SCS Hydrologic Soil Group classifications.

The hydrologic study area of the pre-developed condition consists of five (5) watershed areas with five (5) analysis points. The hydrologic study area in the post-developed condition consists of seven (7) watershed areas with the same five analysis points corresponding to the pre development model. The pre and post development watershed areas and corresponding analysis points are described in the following sections and shown on the Watershed Plans submitted in Appendices A and B, respectively.

The Bristol County Soil Conservation Service (SCS) mapping for this area indicates a number of different soil types ranging from Scarboro Muck to Urban Land. The predominant soil classifications are as follows:

- Scarboro muck (39A), 0 to 1 percent slopes – Hydrologic Soil Group D
- Deerfield loamy sand, (256B), 0 to 5 percent slopes – Hydrologic Soil Group B
- Udorthents (651),– Hydrologic Soil group B
- Urban Land, 0 to 15 percent slopes (602) – Assumed to be Hydrologic Soil Group C

### **1.3 Pre-Development Hydrologic Summary**

In the present condition, the site is comprised of five (5) watershed areas as shown on the attached Pre Development Watershed Plan. The watershed designations and corresponding analysis points are as follows:

- Subcatchment PRE A is a 0.79-acre portion of the overall watershed area consisting of an existing bituminous pavement driveway with miscellaneous concrete rubble section and a portion of the main access driveway. This area currently flows unattenuated towards the main driveway then northerly towards a bordering vegetated wetland (BVW) system which is being considered as Analysis Point 1 (WET-8) in the Pre Development Hydrologic Analysis.
- Subcatchment PRE B is a 1.58-acre portion of the overall watershed area consisting of a heavily wooded area that surrounds a bordering vegetated wetland system (WET-1). This area also includes a portion of concrete slab and a section of the main access driveway. This area currently flows towards the bordering vegetated wetland system (WET-1) which is being considered as Analysis Point 2 in the Pre Development Hydrologic Analysis.
- Subcatchment PRE C is a 4.30-acre portion of the overall watershed area consisting of a large portion of the existing roof and existing paved surfaces that flow through a closed piping system to a grassed swale located south of the proposed building. This swale eventually discharges to an existing 18" corrugated metal pipe, which is being considered as Analysis Point 3 in the Pre Development Hydrologic Analysis.
- Subcatchment PRE D is a 1.69-acre portion of the overall watershed consisting of a small portion of roof area that is piped to an existing bordering vegetated wetland (WET-2) which is being considered as Analysis Point 4 in the Pre Development Hydrologic Analysis. The remaining area is a combination of bituminous pavement from the loading dock and driveway and areas of heavily wooded vegetation that surrounds the bordering vegetated wetland (WET-2).

- Subcatchment PRE E is a 2.72-acre portion of the overall watershed area consisting of an existing concrete slab, concrete walk, access drive and vegetated woodlands surrounding another bordering vegetated wetland (WET-3) which is being considered as Analysis Point 5 in the Pre Development Hydrologic Analysis.

A summary of the pre development hydrologic conditions for the 2, 10, 25, and 100-year storm events is submitted in Table 1.3 below.

Table 1.3 – Pre Development Hydrologic Summary

Storm Event	Analysis Point AP-1 Rate of Flow (c.f.s.)	Analysis Point AP-2 Rate of Flow (c.f.s.)	Analysis Point AP-3 Rate of Flow (c.f.s.)	Analysis Point AP-4 Rate of Flow (c.f.s.)	Analysis Point AP-5 Rate of Flow (c.f.s.)
2-year storm	2.62	2.60	11.36	3.22	7.68
10-year storm	3.65	4.55	17.17	5.17	11.35
25-year storm	4.28	5.81	20.74	6.39	13.60
100-year storm	5.39	8.07	26.96	8.55	17.50

#### 1.4 Post Development Hydrologic Summary

In the developed condition, the site is comprised of seven (7) watershed areas as shown on the attached Post Development Watershed Plan. The designated post development analysis points correspond to the previously described pre development analysis points. The watershed designations and corresponding analysis points for each of the post development watersheds are as follows:

- Subcatchment POST 1 is a 1.881 acre portion of the overall watershed area consisting of a proposed gravel trailer parking lot and grassed area abutting the access drive. Stormwater run-off flows overland from the gravel lot to a rip rap waterway that discharges to a sediment forebay. The forebay is hydraulically connected to a bioretention area (Basin-1) which will discharge runoff at a controlled rate towards an existing bordering vegetated wetland system (WET-1) being considered Analysis Point 2 in the hydrologic calculations.
- Subcatchment POST 1A is a 1.10 acre portion of the overall watershed area which consists of existing grass and wooded areas which will continue to flow unattenuated towards the existing bordering vegetated wetland (WET-1) being considered Analysis Point 1 in the hydrologic calculations.
- Subcatchment POST 2 is a 3.62 acre portion of the overall watershed area consisting of the roof area of the existing building to remain, a new loading dock area and access driveways that will flow through a small bioretention area prior to discharge at a controlled rate to an existing 18" corrugated metal pipe that currently flows offsite. This pipe outfall is taken as Analysis Point 3 in the hydrologic calculations.
- Subcatchment POST 3 is a 0.68 acre portion of the overall watershed area consisting of the existing paved loading area and associated landscaped areas that will now flow through a proposed bioretention area prior

to discharge at a controlled rate to an existing bordering vegetated wetland system (WET-2) being taken as Analysis Point 4 in the hydrologic calculations.

- Subcatchment POST 3A is 1.09 acre portion of the overall watershed area consisting of the undeveloped areas surrounding the existing bordering vegetated wetland system (WET-2) that will continue to flow unattenuated towards the wetland being taken as Analysis Point 4 in the hydrologic calculations.
- Subcatchment POST 4 is a 1.90 acre portion of the overall watershed area consisting of a portion of the remaining concrete slab, the new paved parking area and existing paved access driveways that will now flow through a proposed sediment forebay and bioretention area prior to discharging at a controlled rate to another existing bordering vegetated wetland system (WET-3), being taken as Analysis Point 5 in the hydrologic calculations.
- Subcatchment POST 4A is a 0.82 acre portion of the overall watershed area consisting of portions of the existing paved access drive, and vegetated areas surrounding an existing bordering vegetated wetland system (WET-3), which will continue to flow unattenuated towards the wetland.

A summary of the post-development hydrologic conditions for the 2, 10, 25, and 100-year storm events is submitted in Table 1.4 below.

Table 1.4 – Post Development Hydrologic Summary

Storm Event	Analysis Point AP-1 Rate of Flow (c.f.s.)	Analysis Point AP-2 Rate of Flow (c.f.s.)	Analysis Point AP-3 Rate of Flow (c.f.s.)	Analysis Point AP-4 Rate of Flow (c.f.s.)	Analysis Point AP-5 Rate of Flow (c.f.s.)
2-year storm	N/A	1.19	9.96	2.07	6.48
10-year storm	N/A	2.37	14.26	3.55	9.66
25-year storm	N/A	3.06	16.64	4.45	11.42
100-year storm	N/A	6.92	21.81	6.26	15.24

A summary of the pre and post-development hydrologic conditions for the 2, 10, 25, and 100-year storm events is submitted in Table 1.5 below. Results shown as a "negative" represent a decrease in post development condition rates of runoff.

Table 1.5 – Pre-Post Development Hydrologic Results

Storm Event	Analysis Point AP-1 Rate of Flow	Analysis Point AP-2 Rate of Flow	Analysis Point AP-3 Rate of Flow	Analysis Point AP-4 Rate of Flow	Analysis Point AP-5 Rate of Flow
2-year storm	n/a	- 54%	-12%	-36%	-16%
10-year storm	n/a	-48%	-17%	-31%	-15%
25-year storm	n/a	-47%	-20%	-30%	-16%
100-year storm	n/a	-14%	-19%	-27%	-13%

The hydrologic analysis indicates that the stormwater management system design for the site meets or reduces peak runoff rates for the 2, 10, 25, and 100 year, 24 hour, Type III storm events from the pre developed levels at the subject analysis points. The analysis show the proposed re-development of this project area will not result in an increase in the rates of runoff to the respective analysis points.

### 1.5 Stormwater Management System Summary

The proposed stormwater management system incorporates a number of Best Management Practices (BMPs), as prescribed in the Department of Environmental Protection Stormwater Management Handbook. These practices include structural and non-structural measures providing stormwater quantity and quality management. These BMPs will function to minimize potential adverse water quality impacts to the surrounding wetland ecosystem. The following sections describe the temporary and permanent stormwater BMPs proposed for the site development.

The proposed stormwater management plan has been developed based on the projected site conditions and the present condition of the water resource areas that receive stormwater runoff from the site. The proposed BMPs have been designed to comply with the Massachusetts Stormwater Management Handbook.

The existing and proposed paved and impervious areas on the developed lot are the primary target area for water quantity and quality control measures for the project. In existing conditions, there is little to no treatment or attenuation being provided to the runoff generated by the impervious surfaces on the lot. The majority of this runoff flows overland directly to the BVW's that surround the site. The goal of the proposed stormwater management system design was to provide the necessary water quality treatment and attenuation for all of the runoff generated in proposed conditions. The stormwater management system makes use of a variety of stormwater Best Management Practices (BMP's) to meet this objective. These BMP's are described in more detail in the follow section.

Runoff from the site will flow through one or a combination of the following BMP structures: bioretention areas, sediment forebays, deep sump catch basins, and/or grassed swale. All basin facilities will be designed to infiltrate (where applicable) as its primary discharge along with an outlet control structure or overflow riprap spillway which will serve to attenuate and/or reduce the rates of runoff to the subject analysis points. Other areas of the paved parking on the site will flow through a deep sump catch basins area to provide the necessary pre-treatment prior to discharge to a stormwater basin. All the areas discharge to one of the many BVW's throughout the site except for one area located along the southern portion of the site which discharges via an 18" corrugated metal pipe culvert to another BVW outside the project limits. The predicted Total Suspended Solids (TSS) Removal and Water Quality calculations for these areas are submitted in Section 4. Calculations have been provided to show that the proposed stormwater management system will provide more than adequate water quality volumes and capabilities to handle the proposed paved and impervious areas on the developed portions of the lot prior to discharge.

## **1.6 Select Structural Best Management Practices (BMP's)**

### **Hooded Catch Basins with Deep Sumps**

Stormwater from portions of the paved parking and driveway areas will be collected in a closed conduit piping system fitted with 4-foot deep sump catch basins with hooded outlets. Catch basin sump systems are effective devices for removal of large matter and pollutants that adsorb to sediments and other particulates. Catch basins with sumps and hooded outlets are designed to trap sediment particles and floating contaminants (e.g., oil and greases), that are typically the most significant constituents of the urban runoff pollutant load. Regular maintenance and cleaning of catch basins is required to assure adequate performance of these structures. A specific maintenance schedule is submitted in this document and on the plans.

### **Bio-Retention Areas**

Stormwater from proposed gravel trailer parking and driveway areas will discharge directly to surface bioretention areas which are also effective devices for removal of large matter and pollutants that adsorb to sediments and other particulates. The pre-treatment device for the bioretention areas will be a sediment forebay to remove the fines generated from the gravel materials. The bioretention areas consist of depressed areas which allow pollutants to settle out prior to discharging either via an outlet control structure or surface spillway. The bioretention areas are constructed with a mulch surface over a soil amendment zone which will also promote some recharge throughout the site.

### **Sediment Forebays**

Runoff from portions of the existing (and proposed) paved parking and paved material storage areas will be conveyed to a sediment forebay in advance the proposed bioretention areas. The forebays are designed to accept a minimum 0.10 inch per contributing acre of watershed area and are approximately 1.5 feet deep.

## **1.7 Select Non-Structural Best Management Practices (BMP's)**

### **Pavement Sweeping Program**

All paved surfaces will be swept once annually. The sweeping program will remove contaminants directly from the paved surfaces before their release into the stormwater runoff. The U.S. Environmental Protection Agency has determined that pavement sweeping can be an effective initial treatment for reducing pollutant loading into stormwater runoff.

### **Stormwater Management System Maintenance Program**

All structural components of the stormwater management system will be inspected and maintained of a regular basis in accordance with the requirements of the Stormwater Management Policy. A detailed Stormwater Management System Operation and Maintenance Plan has been prepared in accordance with the Stormwater Management Standards and Stormwater Management Handbook prepared by the Massachusetts Department of Environmental Protection.

## 1.8 Regulatory Compliance

The Massachusetts Stormwater Handbook, Volume 3 (February, 2008), has been used as the primary guidance for the selection and design of permanent non-structural and structural BMPs for the long-term protection of existing wetland and water resources. The Stormwater Management Plan developed for this project incorporates water quantity and quality controls that will protect surface and groundwater resources, wetlands and adjacent properties from potential impacts due to increased impervious areas on the site. The Stormwater Management Plan also incorporates select LID measures in accordance with the new Stormwater Management Policies.

The stormwater performance standards developed by the DEP and a brief discussion on how the proposed project will achieve the standards are provided below. The Stormwater Management System Compliance Certification and Checklist has been included as the Preface to this Report.

**Standard 1. No new stormwater conveyances may discharge untreated stormwater directly to, or cause erosion in wetlands or waters of the Commonwealth.**

- No proposed site stormwater conveyance system will discharge untreated stormwater runoff directly to wetlands. Stormwater runoff from the paved surfaces and parking areas will be collected and treated by a closed conduit pipe system or overland to one or a series structural BMPs consisting of a deep sump/hooded catch basins, bioretention areas, grassed water quality swales, and sediment forebays. Riprap pads and level spreader spillways have been installed at the point of discharge of all drainage outfalls to eliminate potential erosive flow velocities and dissipate the energy of the discharged stormwater, thereby avoiding sedimentation to the downgradient areas.

**Standard 2. Stormwater management systems shall be designed so that the post-development peak discharge rates do not exceed pre-development peak discharge rates.**

- The storage volume within the bioretention areas will serve to limit the peak rates of stormwater runoff at or below pre development levels for the 2-, 10-, 25- and 100-year storm events. Refer to the Calculations in Sections 3 & 4 for additional information.

**Standard 3. Loss of annual recharge to groundwater shall be eliminated or minimized through the use of environmentally sensitive site design, low impact development techniques, stormwater best management practices, and good operation and maintenance. At a minimum, the annual recharge from the post- development site shall approximate the annual recharge from pre-development conditions based on soil type. This Standard is met when the stormwater management system is designed to infiltrate the required recharge volume as determined in accordance with the Massachusetts Stormwater Handbook.**

- While Standard 3 is not applicable due to the reduction in the overall impervious area on the project site, provisions for groundwater recharge have been provided via the proposed bioretention areas being proposed on the site. As currently there is virtually no recharge being provided for the substantial impervious surfaces on the site, the proposed stormwater management system will provide an improvement to existing recharge conditions on the site.

- Standard 4.** Stormwater management systems shall be designed to remove 80% of the average annual post-construction load of Total Suspended Solids (TSS). This standard is met when:
- a) Suitable practices for source control and pollution prevention are identified in a long-term pollution prevention plan, and thereafter are implemented and maintained;
  - b) Structural stormwater best management practices are sized to capture the required water quality volume as determined in accordance with the Massachusetts Stormwater Handbook; and
  - c) Pretreatment is provided in accordance with the Massachusetts Stormwater Handbook.
- The 80 percent TSS removal rate will be achieved with the installation of sediment forebays, deep sump/hooded catch basins, and bioretention areas. The aggregate total of both structural and non-structural BMPs will meet or exceed the target 80% removal rate. Detailed TSS removal calculations are submitted in Section 4. Pavement sweeping has also been incorporated into the Operation and Maintenance Plan shown on the plans and will be a requirement of the approval.

- Standard 5.** For land uses with higher potential pollutant loads, source control and pollution prevention shall be implemented in accordance with the Massachusetts Stormwater Handbook to eliminate or reduce the discharge of stormwater runoff from such land uses to the maximum extent practicable. If, through source control and/or pollution prevention, all land uses with higher potential pollutant loads cannot be completely protected from exposure to rain, snow, snow melt and stormwater runoff, the proponent shall use the specific structural stormwater BMPs determined by the Department to be suitable for such uses as provided in the Massachusetts Stormwater Handbook. Stormwater discharges from land uses with higher potential pollutant loads shall also comply with the requirements of the Massachusetts Clean Waters Act, M.G.L.c. 21, §§ 26-53 and the regulations promulgated thereunder at 314 CMR 3.00, 314 CMR 4.00 and 314 CMR 5.00.
- This project would not be considered a project with land uses with higher potential pollutant loads as defined in the Stormwater Management Standards.

- Standard 6.** Stormwater discharges within the Zone II or Interim Wellhead Protection Area of a public water supply and stormwater discharges near or to any other critical area require the use of the specific source control and pollution prevention measures and the specific structural stormwater best management practices determined by the Department to be suitable for managing discharges to such areas, as provided in the Massachusetts Stormwater Handbook.
- The project does not discharge within a Critical Area as defined in the Stormwater Management Standards.

- Standard 7.** A redevelopment project is required to meet the following Stormwater Management Standards only to the maximum extent practicable: Standard 2, Standard 3, and the pretreatment and structural stormwater best management practice requirements of Standards 4, 5, and 6. Existing stormwater discharges shall comply with Standard 1 only to the maximum extent practicable. A redevelopment project shall also comply with all other requirements of the Stormwater Management Standards and improve existing conditions.

- While this project would be considered a redevelopment project under the Stormwater Management Policy, the proposed project still meets all of the applicable Stormwater Management Standards. Standard 4, related to recharge, would not be applicable as there is actually a decrease in the total impervious area on the site as a result of this development.

**Standard 8. A plan to control construction-related impacts, including erosion, sedimentation, and other pollutant sources during construction and land disturbance activities (construction period erosion, sedimentation, and pollution prevention plan) shall be developed and implemented.**

- The proposed development will incorporate erosion and sedimentation controls to minimize the potential for sedimentation in down gradient resources. These controls will include hay bales/silt fence barriers, and slope stabilization measures such as hay/straw blankets and jute matting. The proponent will complete a Stormwater Pollution Prevention Plan prior to construction in accordance with the NPDES General Permit for Stormwater Discharges associated with Construction Projects and this SWPPP will also be used as the plan to meet this standard.

**Standard 9. A Long -Term Operation and Maintenance (O&M) Plan shall be developed and implemented to ensure that stormwater management systems function as designed.**

- The Stormwater Management Plan for this project has been developed in full compliance with the DEP Stormwater Management Policy. The Plan is based on a multi-dimensional approach to stormwater management that recognizes the need for proper site planning, source control of potential contaminants, and implementation of structural and non-structural treatment methods to ensure the protection of water resources in the vicinity of the site and adjacent properties. The Stormwater Operation and Maintenance Plan is provided on the construction drawings. A more detailed Long-Term Operation and Maintenance Plan is also included in the following sections.

**Standard 10. Illicit Discharges to the Stormwater Management System are prohibited.**

- An Illicit Discharge Compliance Statement has been completed and is attached to this Stormwater Management System Report.

1.8 Post Construction Operation and Maintenance Plan

Name and current address of the Applicant

LOGAL, LLC  
98 Blackmer Street  
New Bedford, Massachusetts 02744

Name and address of the Contractor of Record

To be determined and provided to Conservation Commission upon selection.

Plans of Record

Refer to Site Development Plans prepared for LOGAL LLC by Field Engineering and last dated 5/7/14 for locations of all BMP's on site as well as construction details of all BMP's.

1. The contractor shall be responsible for the proper inspection and maintenance of all stormwater management facilities until such time as the Stormwater Management System is accepted by the Owner. Thereafter the Owner shall be responsible for the proper inspection and maintenance of the stormwater facilities in accordance with this Operation and Maintenance Plan as well as the continuing conditions of the Certificate of Compliance on the property.
2. All Structural Best Management Practices (BMP's) including the catch basins, and subsurface infiltration systems should be inspected after every major rainfall event exceeding 1.0-inch for the first 6 months after construction to ensure proper stabilization and construction.
3. Thereafter, regular BMP inspections should be conducted according to the following schedule:

<u>BMP Structure</u>	<u>Inspections per Year</u>
Deep Sump Catch Basins	4
Grassed Swale	2
Rain Garden/Bioretenion Areas	2

4. The owner shall maintain and submit to the Conservation Commission upon request a BMP Inspection Report following each site inspection as recommended above. The BMP Inspection report shall identify the Date of Inspection, the name and contact number of the responsible party, specific structures inspected, specific maintenance required and observations at a minimum, inspection reports should address the following conditions where applicable:
  1. Embankment Subsidence
  2. Erosion
  3. Cracking of Containment Berm
  4. Inlet/Outlet Conditions
  5. Sediment Accumulations
  6. Slope Stability
5. Accumulated silt and sediment should be removed four times a year for sediment forebays and grassed swale or more frequently if accumulated depth of sediment exceeds six inches at the proposed stone check dams.

Accumulated silt and sediment should be removed at least once a year for deep sump catch basins or more frequently if accumulated depth of sediment exceeds six inches.

6. All removed sediments are to be properly disposed of at a location to be approved by the Board of Health. Transportation and disposal of sediments shall comply with all applicable local, state, and federal regulations.
7. The driveway and parking areas shall be swept at least once per year.
8. The bioretention areas, grassed swale, detention basins and all landscaped areas should be inspected for trash on a monthly basis. Any accumulated trash, litter and discarded materials shall be removed.
9. Snow will be stockpiled within and around areas which drain into the stormwater management system wherever practicable. Catch basin grates will be cleaned of snow and ice after all snowfall events. The discharge of snow directly into the wetland resource areas will be prohibited.
10. No disposal of materials will be permitted within the any of the stormwater management system BMP's. This prohibition applies to trash, fill material, construction debris, grass clippings, collected leaves, and cut branches.
11. The embankments, side slopes, and bottom areas of the grassed channels and bioretention areas shall be mowed at least twice annually to facilitate maintenance of the basins.
12. An Operation and Maintenance Inspection Form shall be developed and copies of the completed forms shall be compiled by the Owner. These forms shall be available for review by the Conservation Commission upon request.
13. The Owner shall contract with a maintenance company on an annual basis that will be responsible for the operation and maintenance of the stormwater management system. The contact information for this company shall be provided to the Conservation Commission for their files.
14. The storm water BMP's will be inspected annually during regularly scheduled mid-summer landscaping and weeding operations for invasive or unwanted plants. If invasive species are found, they will be physically uprooted and removed from the area.

#### Invasive Species Control Plan (ISCP)

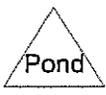
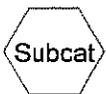
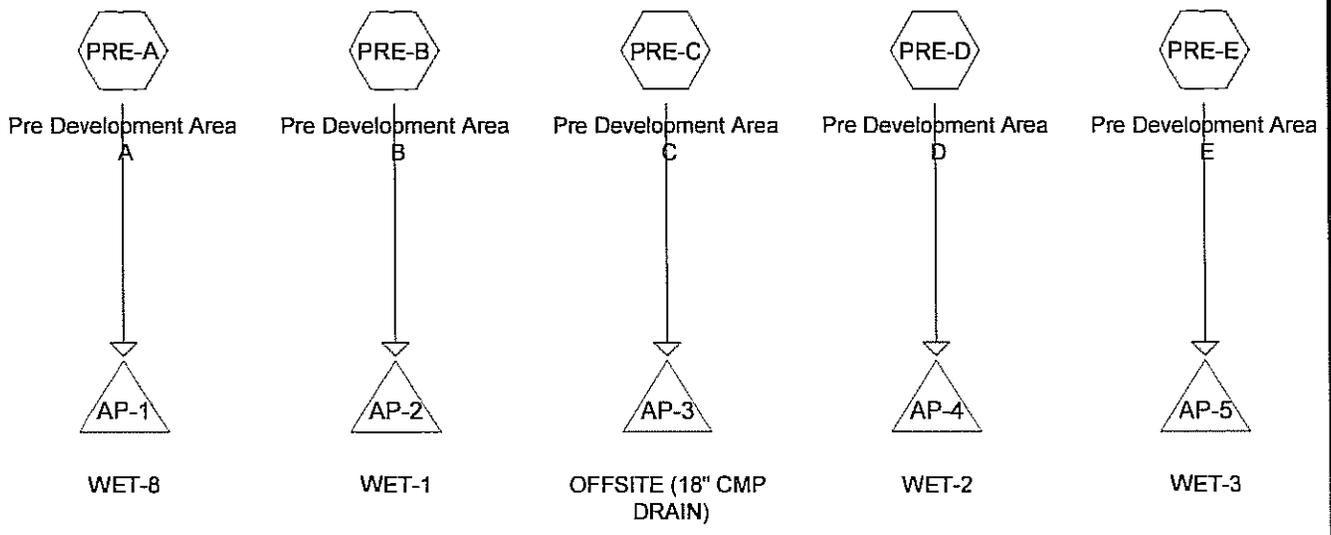
The owner will monitor the grassed channel and bioretention areas/sediment forebays pursuant to the recommendations outlined in the USACE document titled "New England District Compensatory Mitigation Guidance" document, pages 24-26 section 4.f. Invasive Species.. Due to the proximity of the wet basin and grassed channel to the existing bordering vegetated wetland, the applicant has chosen a mechanical control method of removal. Invasive species will be removed by hand (pulling, mowing or excavating on-site). No chemical control will be utilized.

Special attention will be given to assure that none of the following invasive species populate the storm water BMP's: common reed (*Phragmites australis*), Purple loosestrife (*Lythrum salicaria*), Smooth and Common buckthorn (*Frangula alnus*, *Rhamnus carthartica*), Russian and Autumn olives (*Elaeagnus angustifolia* and *E. umbellata*), Multiflora rose (*Rosa multiflora*), Reed canary-grass (*Phalaris arundinacea*), and Japanese knotweed (*Fallopia japonica*)

## *Section 2*

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### *Pre Development Hydrologic Analysis*



**Routing Diagram for 1998-PRE-WS**  
 Prepared by Field Engineering Co. Inc., Printed 5/7/2014  
 HydroCAD® 10.00 s/n 01897 © 2013 HydroCAD Software Solutions LLC

**1998-PRE-WS**

Prepared by Field Engineering Co. Inc.

HydroCAD® 10.00 s/n 01897 © 2013 HydroCAD Software Solutions LLC

Type III 24-hr 2 YR Rainfall=3.50"

Printed 5/7/2014

Page 2

Time span=0.00-48.00 hrs, dt=0.02 hrs, 2401 points  
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN  
Reach routing by Dyn-Stor-Ind method - Pond routing by Dyn-Stor-Ind method

<b>Subcatchment PRE-A: Pre Development</b>	Runoff Area=34,534 sf 91.04% Impervious	Runoff Depth=3.05"
	Tc=6.0 min CN=96	Runoff=2.62 cfs 8,764 cf
<b>Subcatchment PRE-B: Pre Development</b>	Runoff Area=68,997 sf 17.39% Impervious	Runoff Depth=1.43"
	Tc=6.0 min CN=77	Runoff=2.60 cfs 8,225 cf
<b>Subcatchment PRE-C: Pre Development</b>	Runoff Area=187,507 sf 61.29% Impervious	Runoff Depth=2.27"
	Tc=6.0 min CN=88	Runoff=11.36 cfs 35,449 cf
<b>Subcatchment PRE-D: Pre Development</b>	Runoff Area=73,690 sf 38.79% Impervious	Runoff Depth=1.86"
	Tc=10.0 min CN=83	Runoff=3.22 cfs 11,413 cf
<b>Subcatchment PRE-E: Pre Development</b>	Runoff Area=118,556 sf 67.97% Impervious	Runoff Depth=2.45"
	Tc=6.0 min CN=90	Runoff=7.68 cfs 24,185 cf
<b>Pond AP-1: WET-8</b>		Inflow=2.62 cfs 8,764 cf
		Primary=2.62 cfs 8,764 cf
<b>Pond AP-2: WET-1</b>		Inflow=2.60 cfs 8,225 cf
		Primary=2.60 cfs 8,225 cf
<b>Pond AP-3: OFFSITE (18" CMP DRAIN)</b>		Inflow=11.36 cfs 35,449 cf
		Primary=11.36 cfs 35,449 cf
<b>Pond AP-4: WET-2</b>		Inflow=3.22 cfs 11,413 cf
		Primary=3.22 cfs 11,413 cf
<b>Pond AP-5: WET-3</b>		Inflow=7.68 cfs 24,185 cf
		Primary=7.68 cfs 24,185 cf

**Total Runoff Area = 483,284 sf Runoff Volume = 88,036 cf Average Runoff Depth = 2.19"**  
**44.64% Pervious = 215,744 sf 55.36% Impervious = 267,540 sf**

**Summary for Subcatchment PRE-A: Pre Development Area A**

Runoff = 2.62 cfs @ 12.08 hrs, Volume= 8,764 cf, Depth= 3.05"

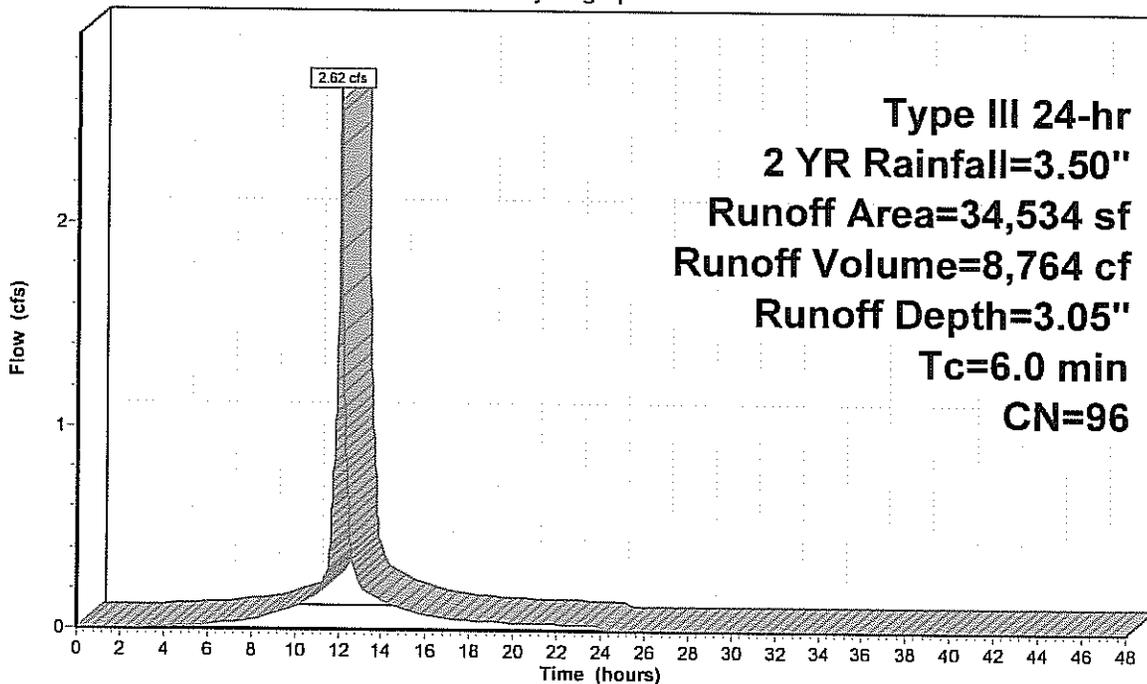
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.02 hrs  
 Type III 24-hr 2 YR Rainfall=3.50"

Area (sf)	CN	Description
31,441	98	Paved parking, HSG C
3,093	74	>75% Grass cover, Good, HSG C
34,534	96	Weighted Average
3,093		8.96% Pervious Area
31,441		91.04% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					Direct Entry,

**Subcatchment PRE-A: Pre Development Area A**

Hydrograph



**Summary for Subcatchment PRE-B: Pre Development Area B**

Runoff = 2.60 cfs @ 12.09 hrs, Volume= 8,225 cf, Depth= 1.43"

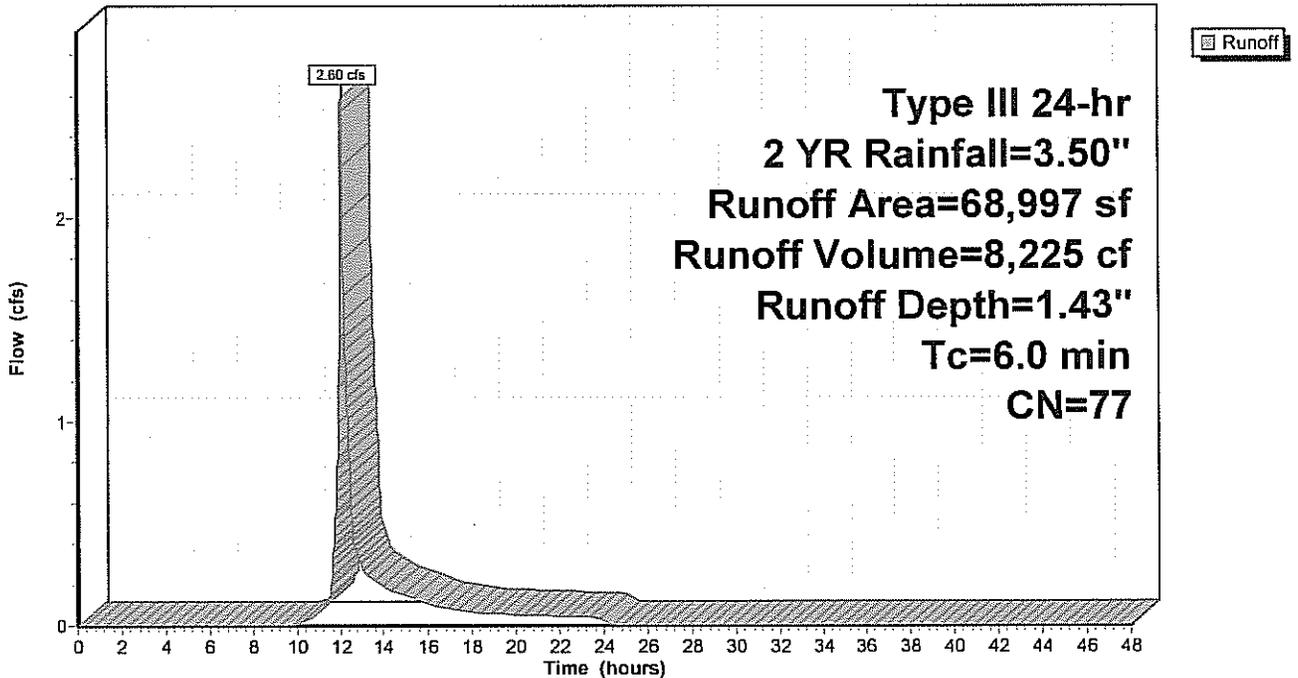
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.02 hrs  
 Type III 24-hr 2 YR Rainfall=3.50"

Area (sf)	CN	Description
11,997	98	Paved parking, HSG C
57,000	72	Woods/grass comb., Good, HSG C
68,997	77	Weighted Average
57,000		82.61% Pervious Area
11,997		17.39% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					Direct Entry,

**Subcatchment PRE-B: Pre Development Area B**

Hydrograph



**Summary for Subcatchment PRE-C: Pre Development Area C**

Runoff = 11.36 cfs @ 12.09 hrs, Volume= 35,449 cf, Depth= 2.27"

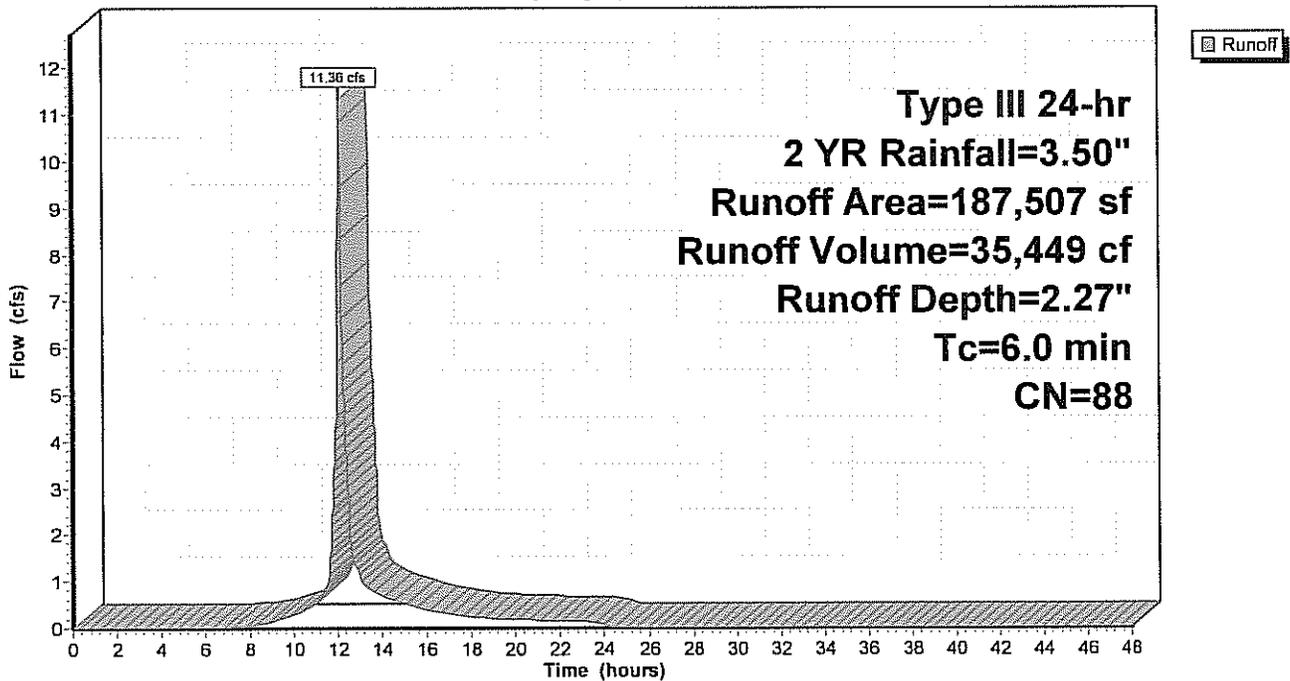
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.02 hrs  
 Type III 24-hr 2 YR Rainfall=3.50"

Area (sf)	CN	Description
37,512	98	Paved parking, HSG C
77,417	98	Roofs, HSG C
72,578	72	Woods/grass comb., Good, HSG C
187,507	88	Weighted Average
72,578		38.71% Pervious Area
114,929		61.29% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					Direct Entry,

**Subcatchment PRE-C: Pre Development Area C**

Hydrograph



**Summary for Subcatchment PRE-D: Pre Development Area D**

Runoff = 3.22 cfs @ 12.14 hrs, Volume= 11,413 cf, Depth= 1.86"

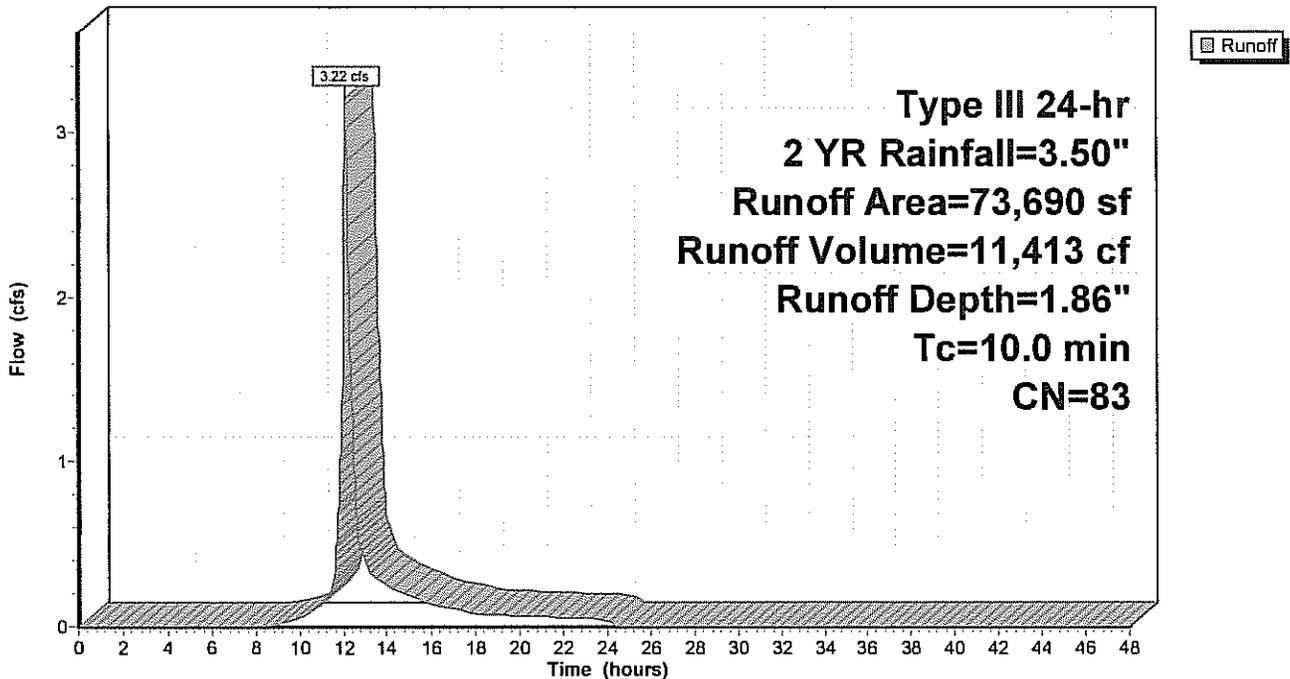
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.02 hrs  
 Type III 24-hr 2 YR Rainfall=3.50"

Area (sf)	CN	Description
13,635	98	Paved parking, HSG C
45,105	74	>75% Grass cover, Good, HSG C
14,950	98	Roofs, HSG C
73,690	83	Weighted Average
45,105		61.21% Pervious Area
28,585		38.79% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
10.0					Direct Entry,

**Subcatchment PRE-D: Pre Development Area D**

Hydrograph



**Summary for Subcatchment PRE-E: Pre Development Area E**

Runoff = 7.68 cfs @ 12.09 hrs, Volume= 24,185 cf, Depth= 2.45"

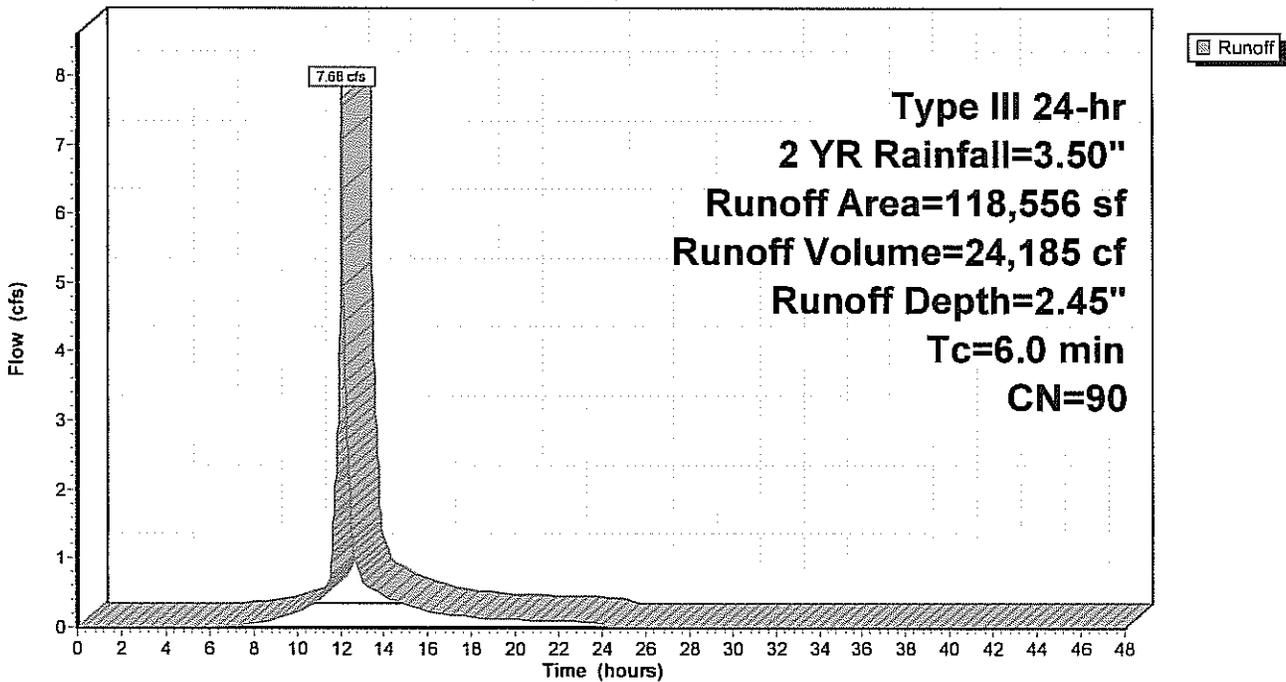
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.02 hrs  
 Type III 24-hr 2 YR Rainfall=3.50"

Area (sf)	CN	Description
80,588	98	Paved parking, HSG C
37,968	72	Woods/grass comb., Good, HSG C
118,556	90	Weighted Average
37,968		32.03% Pervious Area
80,588		67.97% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					Direct Entry,

**Subcatchment PRE-E: Pre Development Area E**

Hydrograph



### Summary for Pond AP-1: WET-8

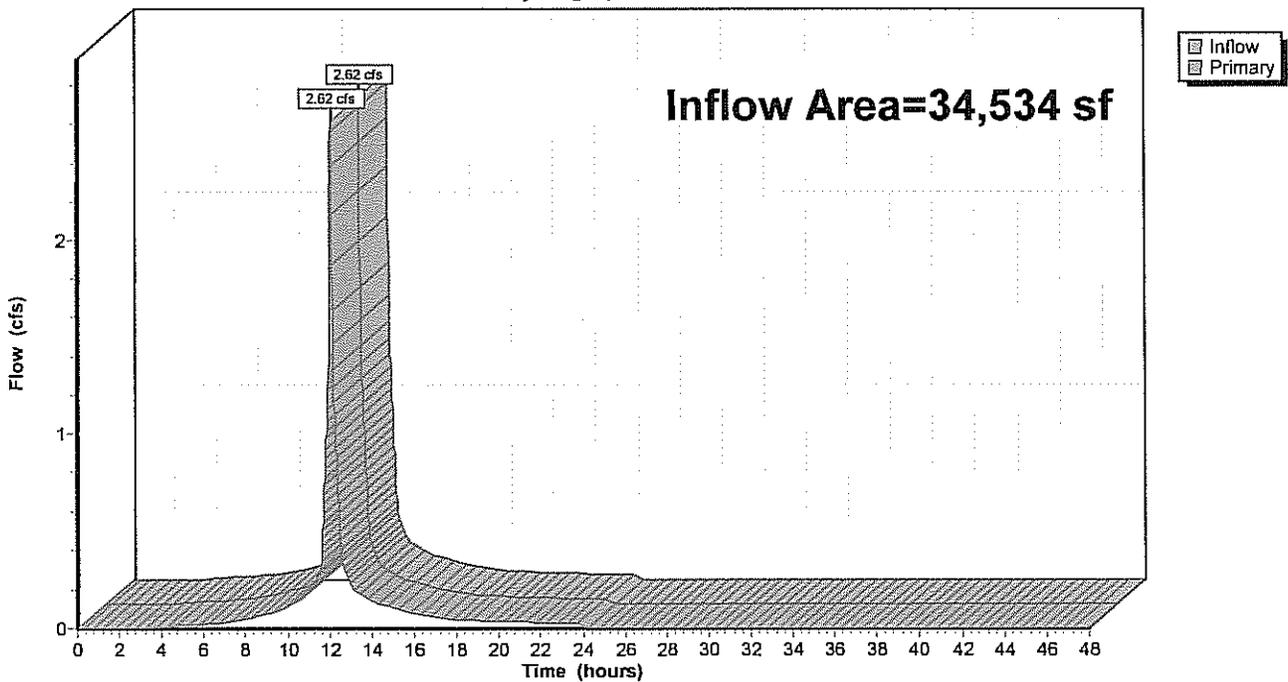
[40] Hint: Not Described (Outflow=Inflow)

Inflow Area = 34,534 sf, 91.04% Impervious, Inflow Depth = 3.05" for 2 YR event  
Inflow = 2.62 cfs @ 12.08 hrs, Volume= 8,764 cf  
Primary = 2.62 cfs @ 12.08 hrs, Volume= 8,764 cf, Atten= 0%, Lag= 0.0 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.02 hrs

### Pond AP-1: WET-8

Hydrograph



### Summary for Pond AP-2: WET-1

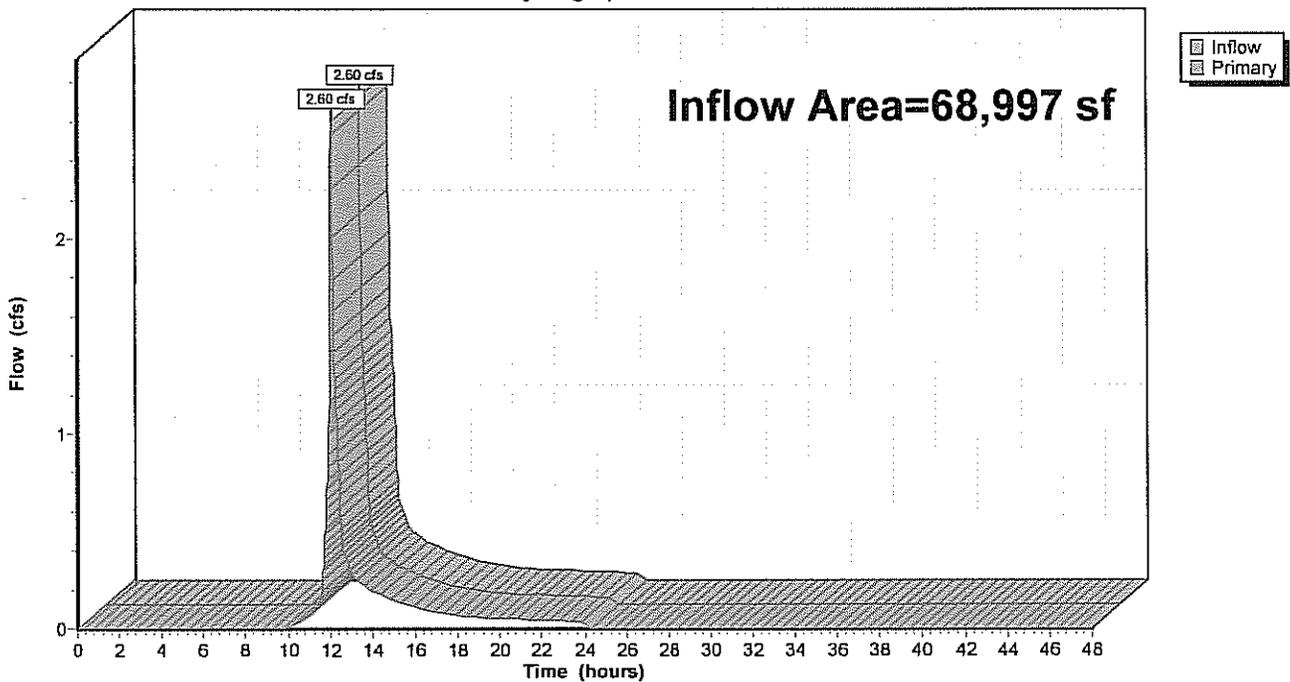
[40] Hint: Not Described (Outflow=Inflow)

Inflow Area = 68,997 sf, 17.39% Impervious, Inflow Depth = 1.43" for 2 YR event  
Inflow = 2.60 cfs @ 12.09 hrs, Volume= 8,225 cf  
Primary = 2.60 cfs @ 12.09 hrs, Volume= 8,225 cf, Atten= 0%, Lag= 0.0 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.02 hrs

### Pond AP-2: WET-1

Hydrograph



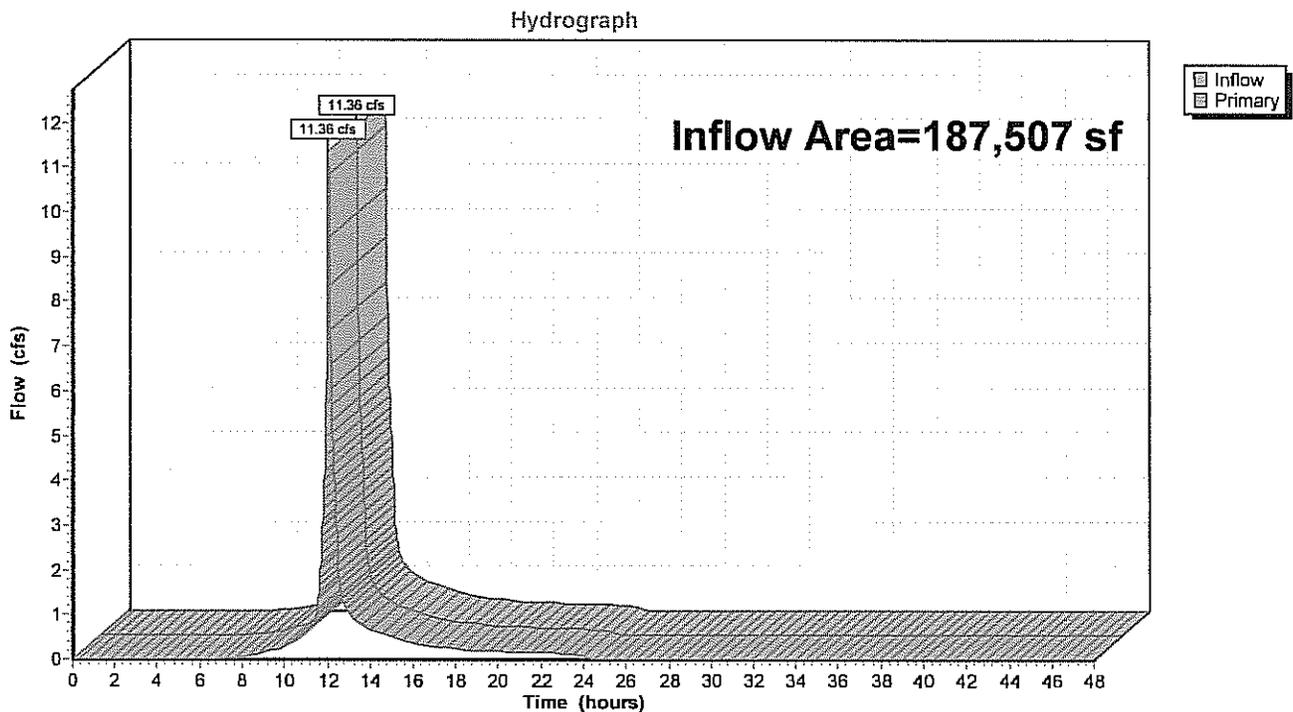
### Summary for Pond AP-3: OFFSITE (18" CMP DRAIN)

[40] Hint: Not Described (Outflow=Inflow)

Inflow Area = 187,507 sf, 61.29% Impervious, Inflow Depth = 2.27" for 2 YR event  
Inflow = 11.36 cfs @ 12.09 hrs, Volume= 35,449 cf  
Primary = 11.36 cfs @ 12.09 hrs, Volume= 35,449 cf, Atten= 0%, Lag= 0.0 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.02 hrs

### Pond AP-3: OFFSITE (18" CMP DRAIN)



### Summary for Pond AP-4: WET-2

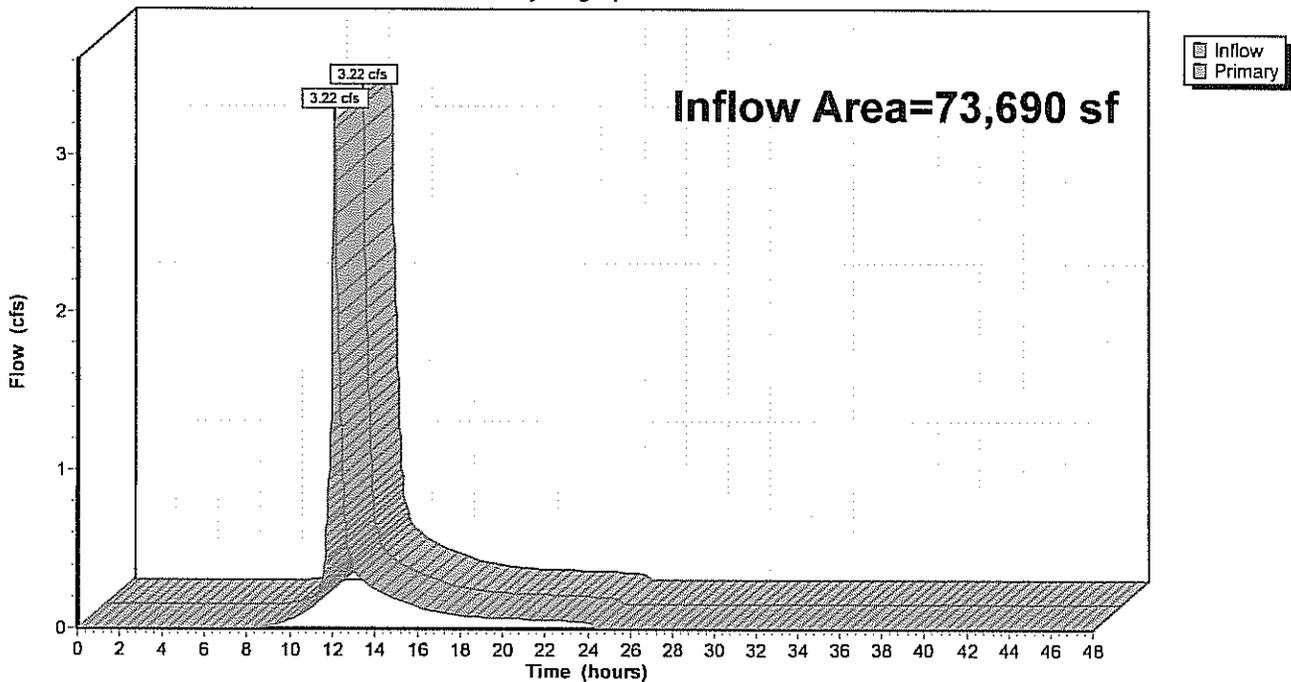
[40] Hint: Not Described (Outflow=Inflow)

Inflow Area = 73,690 sf, 38.79% Impervious, Inflow Depth = 1.86" for 2 YR event  
Inflow = 3.22 cfs @ 12.14 hrs, Volume= 11,413 cf  
Primary = 3.22 cfs @ 12.14 hrs, Volume= 11,413 cf, Atten= 0%, Lag= 0.0 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.02 hrs

### Pond AP-4: WET-2

Hydrograph



### Summary for Pond AP-5: WET-3

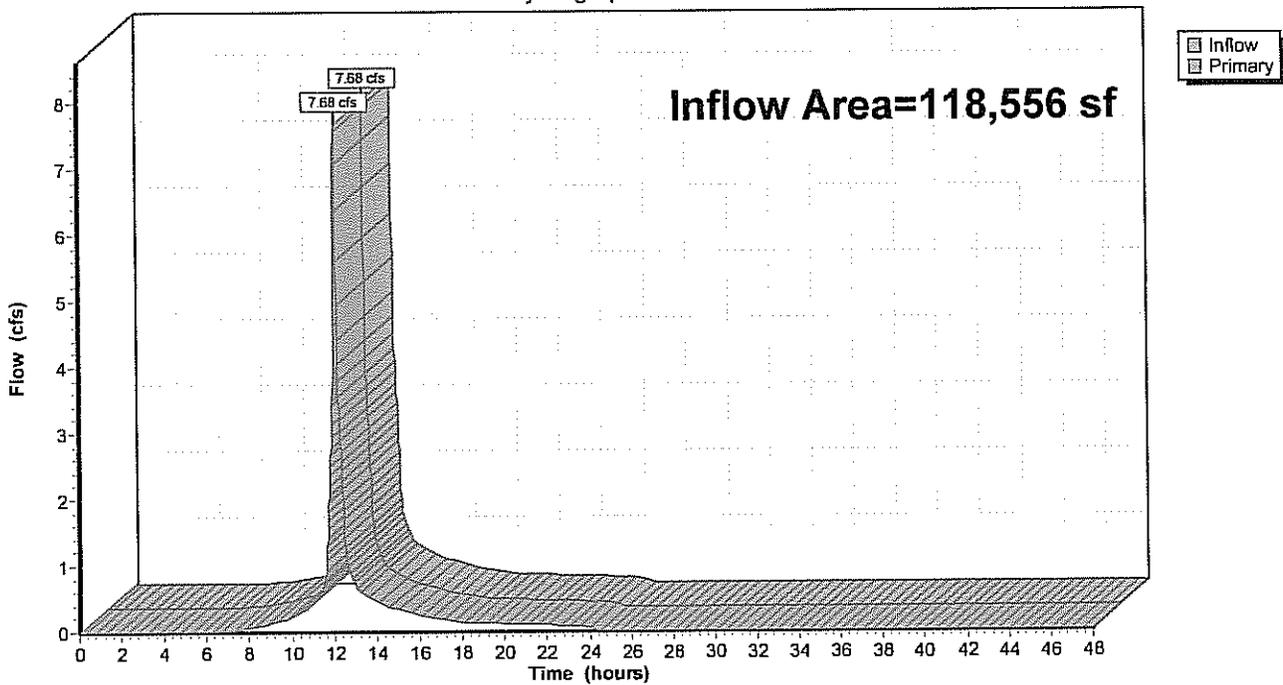
[40] Hint: Not Described (Outflow=Inflow)

Inflow Area = 118,556 sf, 67.97% Impervious, Inflow Depth = 2.45" for 2 YR event  
Inflow = 7.68 cfs @ 12.09 hrs, Volume= 24,185 cf  
Primary = 7.68 cfs @ 12.09 hrs, Volume= 24,185 cf, Atten= 0%, Lag= 0.0 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.02 hrs

### Pond AP-5: WET-3

Hydrograph



Time span=0.00-48.00 hrs, dt=0.02 hrs, 2401 points  
 Runoff by SCS TR-20 method, UH=SCS, Weighted-CN  
 Reach routing by Dyn-Stor-Ind method - Pond routing by Dyn-Stor-Ind method

<b>Subcatchment PRE-A: Pre Development</b>	Runoff Area=34,534 sf 91.04% Impervious	Runoff Depth=4.33"
	Tc=6.0 min CN=96	Runoff=3.65 cfs 12,472 cf
<b>Subcatchment PRE-B: Pre Development</b>	Runoff Area=68,997 sf 17.39% Impervious	Runoff Depth=2.46"
	Tc=6.0 min CN=77	Runoff=4.55 cfs 14,125 cf
<b>Subcatchment PRE-C: Pre Development</b>	Runoff Area=187,507 sf 61.29% Impervious	Runoff Depth=3.48"
	Tc=6.0 min CN=88	Runoff=17.17 cfs 54,366 cf
<b>Subcatchment PRE-D: Pre Development</b>	Runoff Area=73,690 sf 38.79% Impervious	Runoff Depth=2.99"
	Tc=10.0 min CN=83	Runoff=5.17 cfs 18,384 cf
<b>Subcatchment PRE-E: Pre Development</b>	Runoff Area=118,556 sf 67.97% Impervious	Runoff Depth=3.68"
	Tc=6.0 min CN=90	Runoff=11.35 cfs 36,394 cf
<b>Pond AP-1: WET-8</b>		Inflow=3.65 cfs 12,472 cf Primary=3.65 cfs 12,472 cf
<b>Pond AP-2: WET-1</b>		Inflow=4.55 cfs 14,125 cf Primary=4.55 cfs 14,125 cf
<b>Pond AP-3: OFFSITE (18" CMP DRAIN)</b>		Inflow=17.17 cfs 54,366 cf Primary=17.17 cfs 54,366 cf
<b>Pond AP-4: WET-2</b>		Inflow=5.17 cfs 18,384 cf Primary=5.17 cfs 18,384 cf
<b>Pond AP-5: WET-3</b>		Inflow=11.35 cfs 36,394 cf Primary=11.35 cfs 36,394 cf

**Total Runoff Area = 483,284 sf Runoff Volume = 135,740 cf Average Runoff Depth = 3.37"**  
**44.64% Pervious = 215,744 sf 55.36% Impervious = 267,540 sf**

**Summary for Subcatchment PRE-A: Pre Development Area A**

Runoff = 3.65 cfs @ 12.08 hrs, Volume= 12,472 cf, Depth= 4.33"

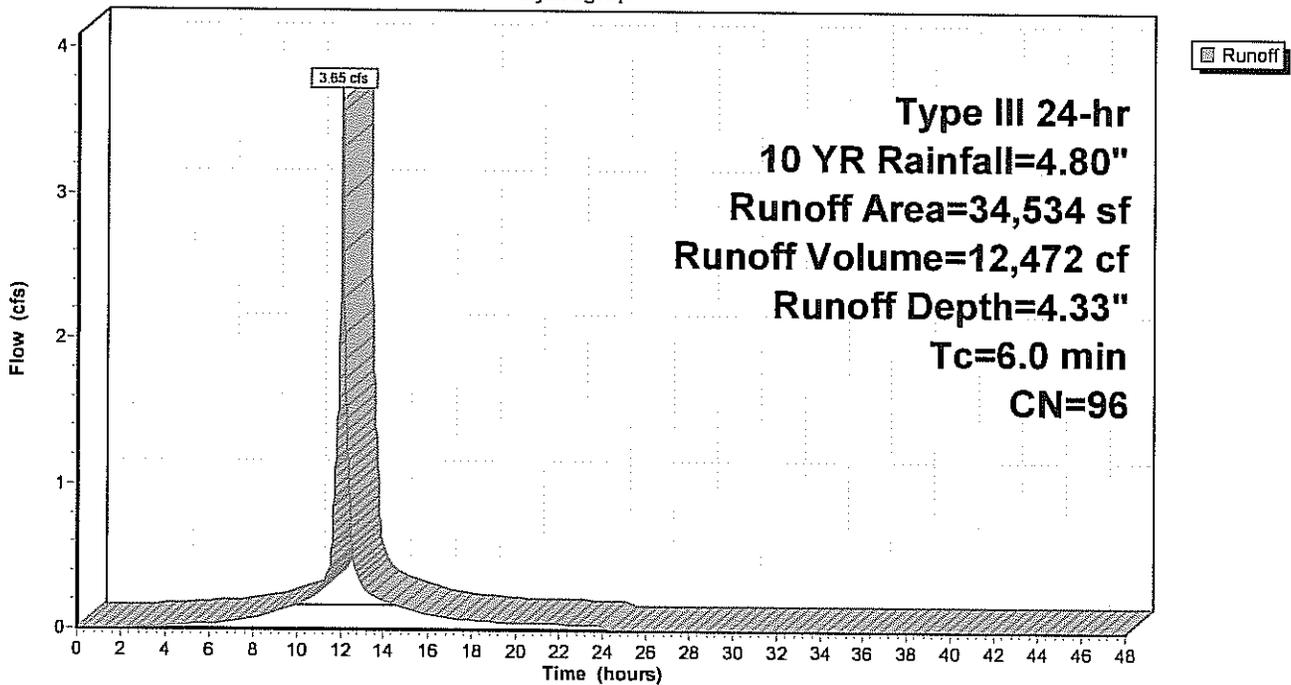
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.02 hrs  
 Type III 24-hr 10 YR Rainfall=4.80"

Area (sf)	CN	Description
31,441	98	Paved parking, HSG C
3,093	74	>75% Grass cover, Good, HSG C
34,534	96	Weighted Average
3,093		8.96% Pervious Area
31,441		91.04% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					Direct Entry,

**Subcatchment PRE-A: Pre Development Area A**

Hydrograph



**Summary for Subcatchment PRE-B: Pre Development Area B**

Runoff = 4.55 cfs @ 12.09 hrs, Volume= 14,125 cf, Depth= 2.46"

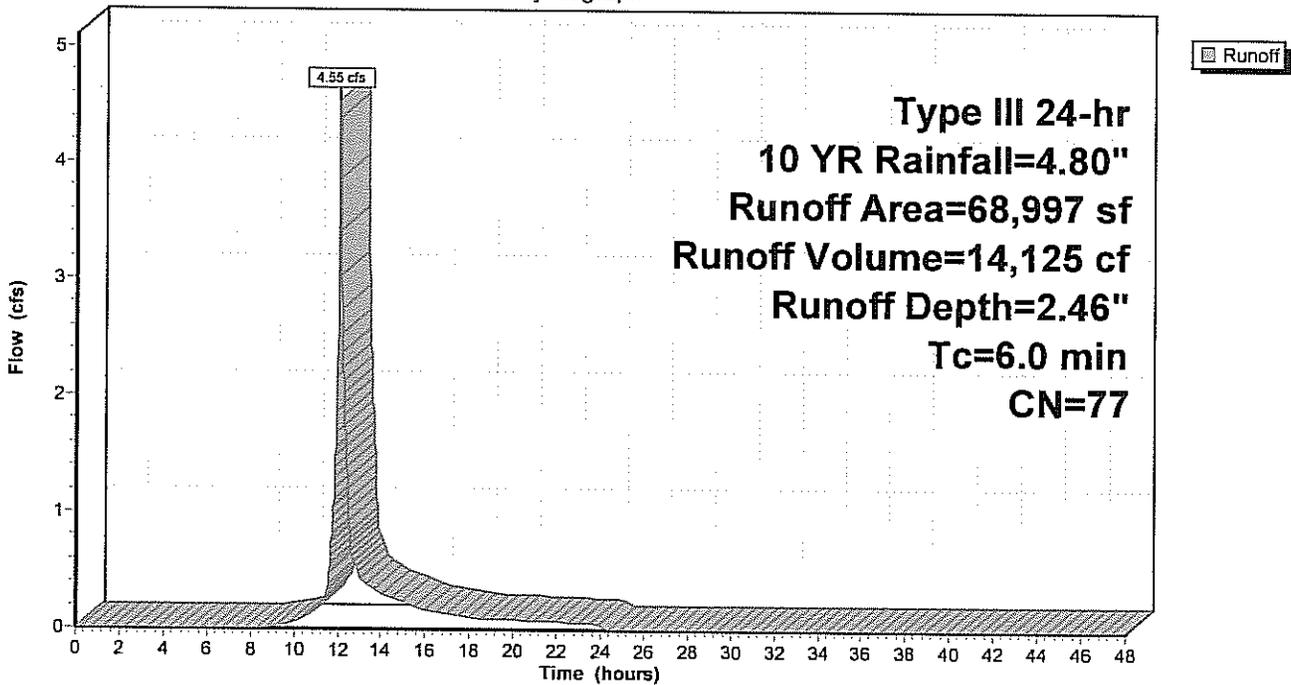
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.02 hrs  
 Type III 24-hr 10 YR Rainfall=4.80"

Area (sf)	CN	Description
11,997	98	Paved parking, HSG C
57,000	72	Woods/grass comb., Good, HSG C
68,997	77	Weighted Average
57,000		82.61% Pervious Area
11,997		17.39% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					Direct Entry,

**Subcatchment PRE-B: Pre Development Area B**

Hydrograph



**Summary for Subcatchment PRE-C: Pre Development Area C**

Runoff = 17.17 cfs @ 12.09 hrs, Volume= 54,366 cf, Depth= 3.48"

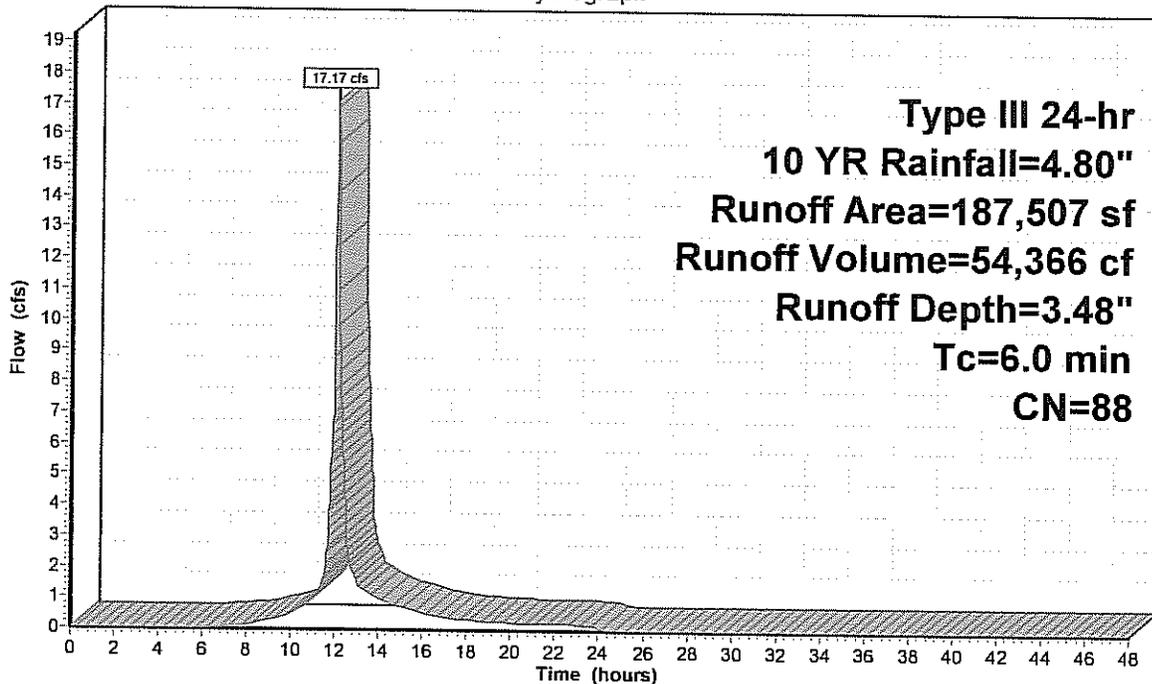
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.02 hrs  
 Type III 24-hr 10 YR Rainfall=4.80"

Area (sf)	CN	Description
37,512	98	Paved parking, HSG C
77,417	98	Roofs, HSG C
72,578	72	Woods/grass comb., Good, HSG C
187,507	88	Weighted Average
72,578		38.71% Pervious Area
114,929		61.29% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					Direct Entry,

**Subcatchment PRE-C: Pre Development Area C**

Hydrograph



**Type III 24-hr  
 10 YR Rainfall=4.80"  
 Runoff Area=187,507 sf  
 Runoff Volume=54,366 cf  
 Runoff Depth=3.48"  
 Tc=6.0 min  
 CN=88**

**Summary for Subcatchment PRE-D: Pre Development Area D**

Runoff = 5.17 cfs @ 12.14 hrs, Volume= 18,384 cf, Depth= 2.99"

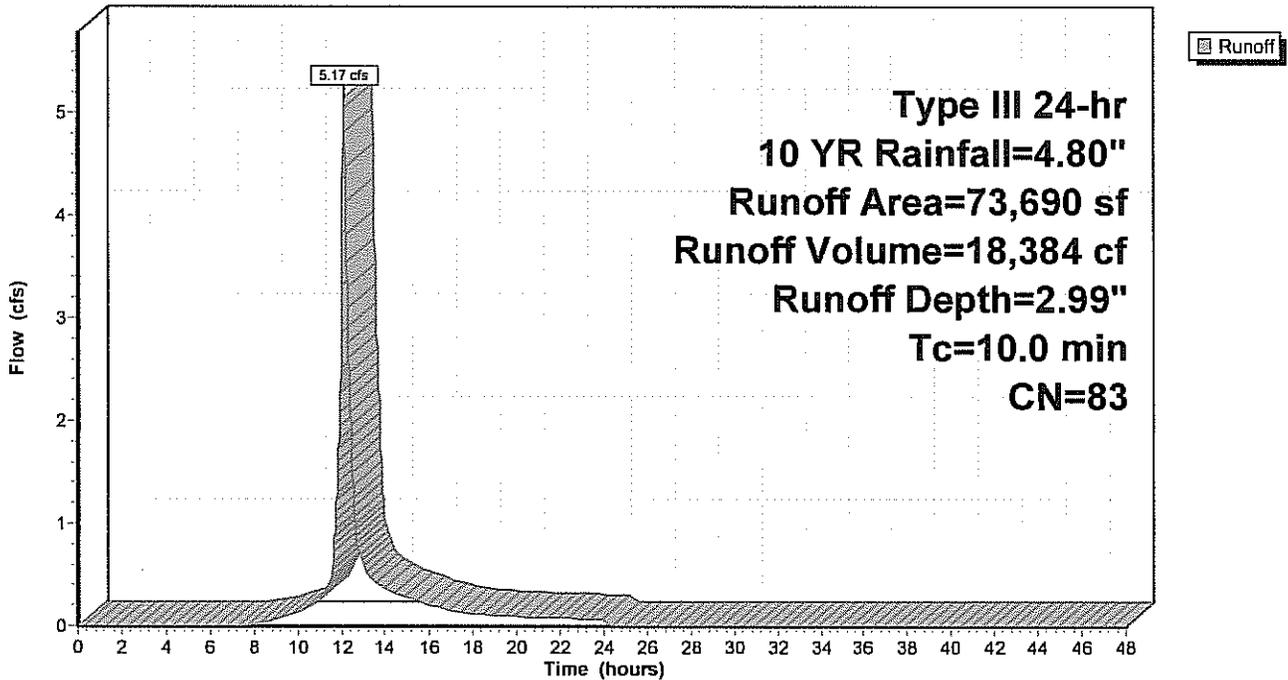
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.02 hrs  
 Type III 24-hr 10 YR Rainfall=4.80"

Area (sf)	CN	Description
13,635	98	Paved parking, HSG C
45,105	74	>75% Grass cover, Good, HSG C
14,950	98	Roofs, HSG C
73,690	83	Weighted Average
45,105		61.21% Pervious Area
28,585		38.79% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
10.0					Direct Entry,

**Subcatchment PRE-D: Pre Development Area D**

Hydrograph



**Summary for Subcatchment PRE-E: Pre Development Area E**

Runoff = 11.35 cfs @ 12.09 hrs, Volume= 36,394 cf, Depth= 3.68"

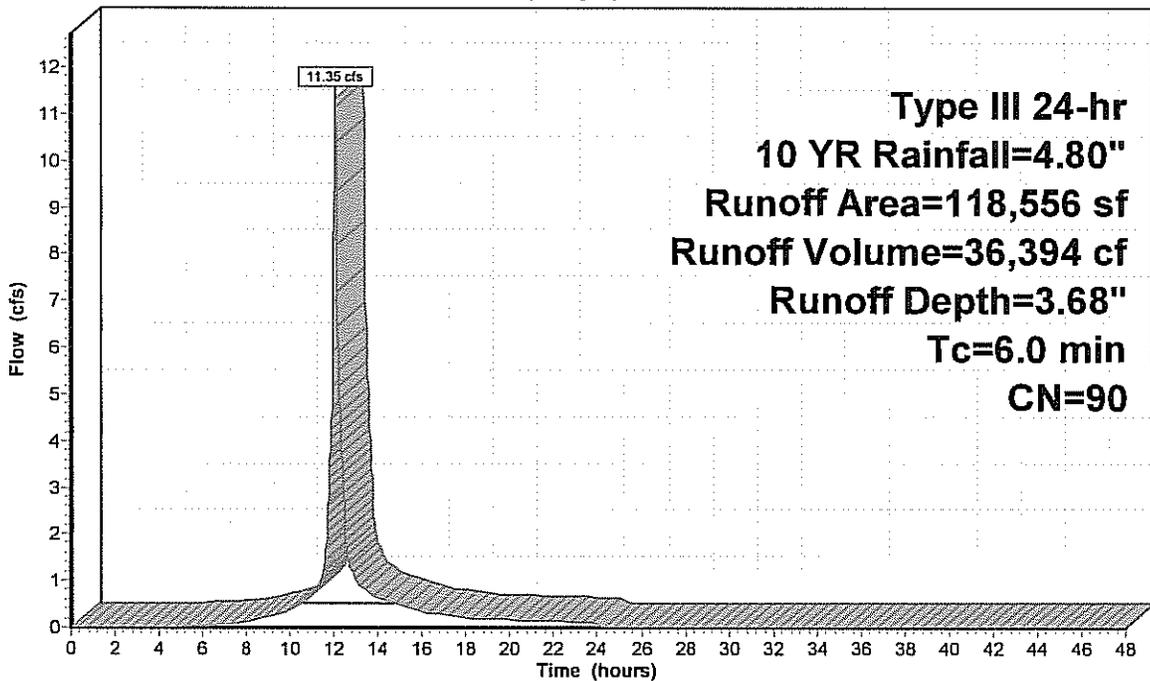
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.02 hrs  
 Type III 24-hr 10 YR Rainfall=4.80"

Area (sf)	CN	Description
80,588	98	Paved parking, HSG C
37,968	72	Woods/grass comb., Good, HSG C
118,556	90	Weighted Average
37,968		32.03% Pervious Area
80,588		67.97% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					Direct Entry,

**Subcatchment PRE-E: Pre Development Area E**

Hydrograph



Runoff

### Summary for Pond AP-1: WET-8

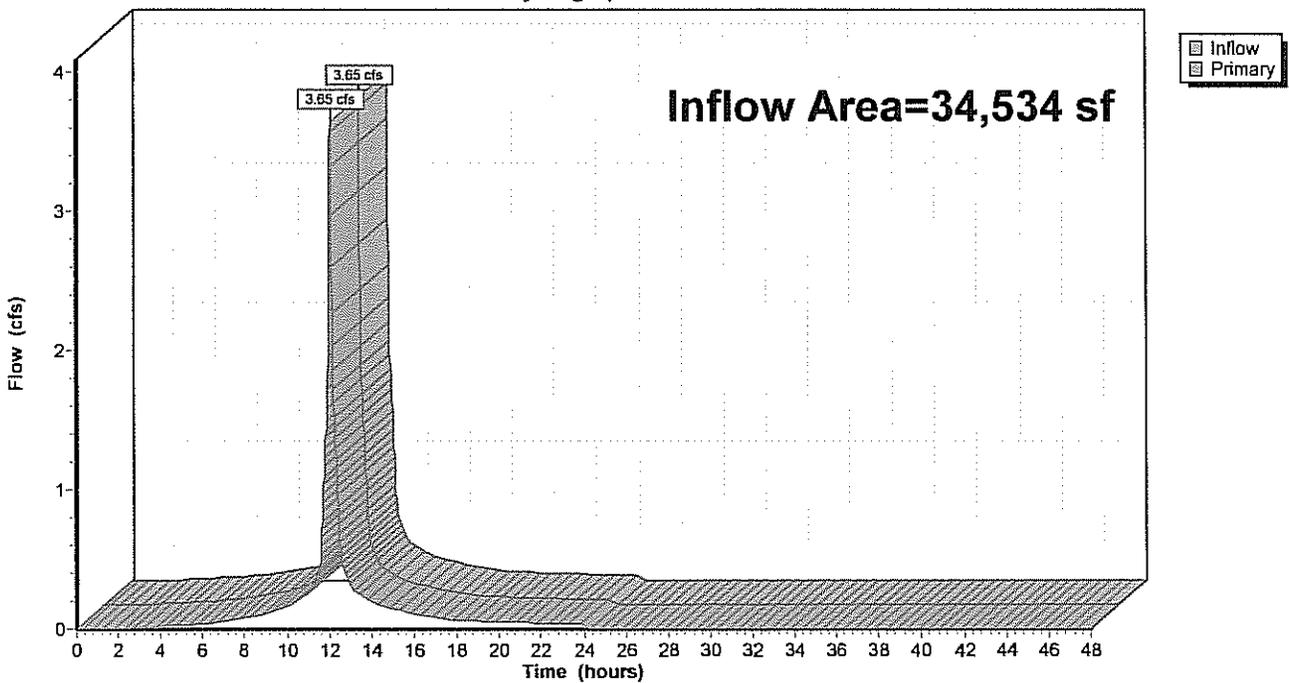
[40] Hint: Not Described (Outflow=Inflow)

Inflow Area = 34,534 sf, 91.04% Impervious, Inflow Depth = 4.33" for 10 YR event  
Inflow = 3.65 cfs @ 12.08 hrs, Volume= 12,472 cf  
Primary = 3.65 cfs @ 12.08 hrs, Volume= 12,472 cf, Atten= 0%, Lag= 0.0 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.02 hrs

### Pond AP-1: WET-8

Hydrograph



### Summary for Pond AP-2: WET-1

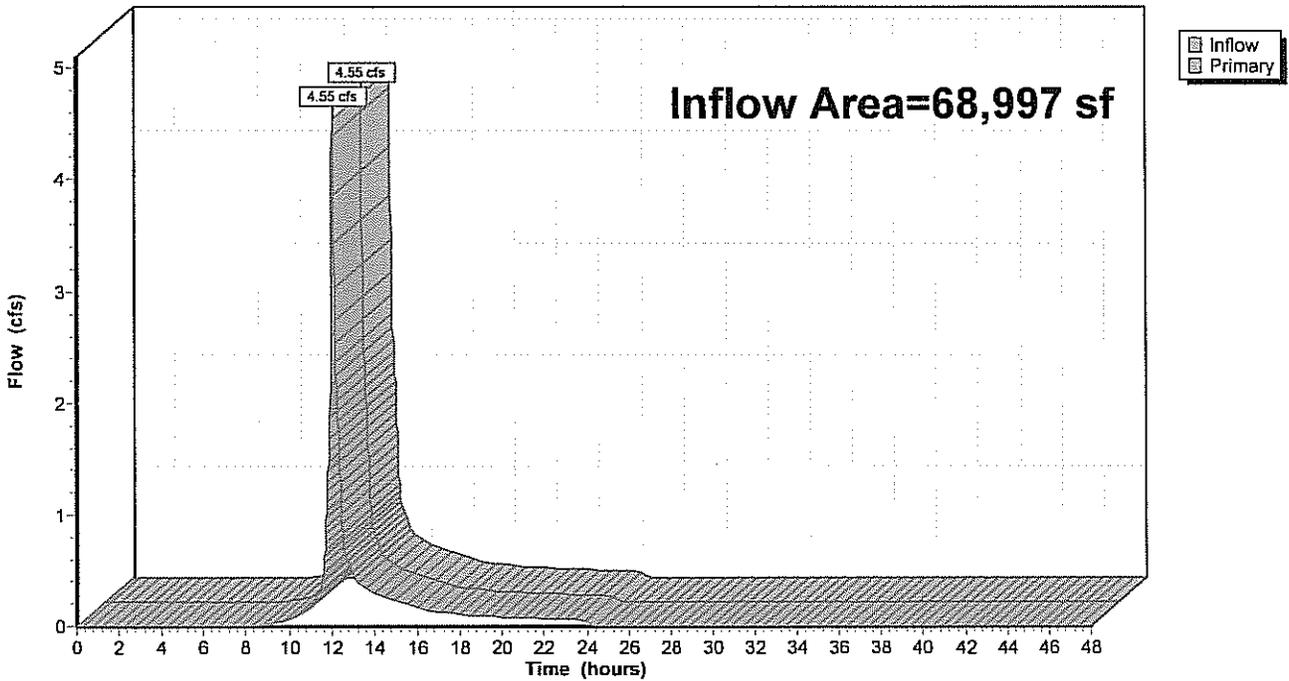
[40] Hint: Not Described (Outflow=Inflow)

Inflow Area = 68,997 sf, 17.39% Impervious, Inflow Depth = 2.46" for 10 YR event  
Inflow = 4.55 cfs @ 12.09 hrs, Volume= 14,125 cf  
Primary = 4.55 cfs @ 12.09 hrs, Volume= 14,125 cf, Atten= 0%, Lag= 0.0 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.02 hrs

### Pond AP-2: WET-1

Hydrograph



### Summary for Pond AP-3: OFFSITE (18" CMP DRAIN)

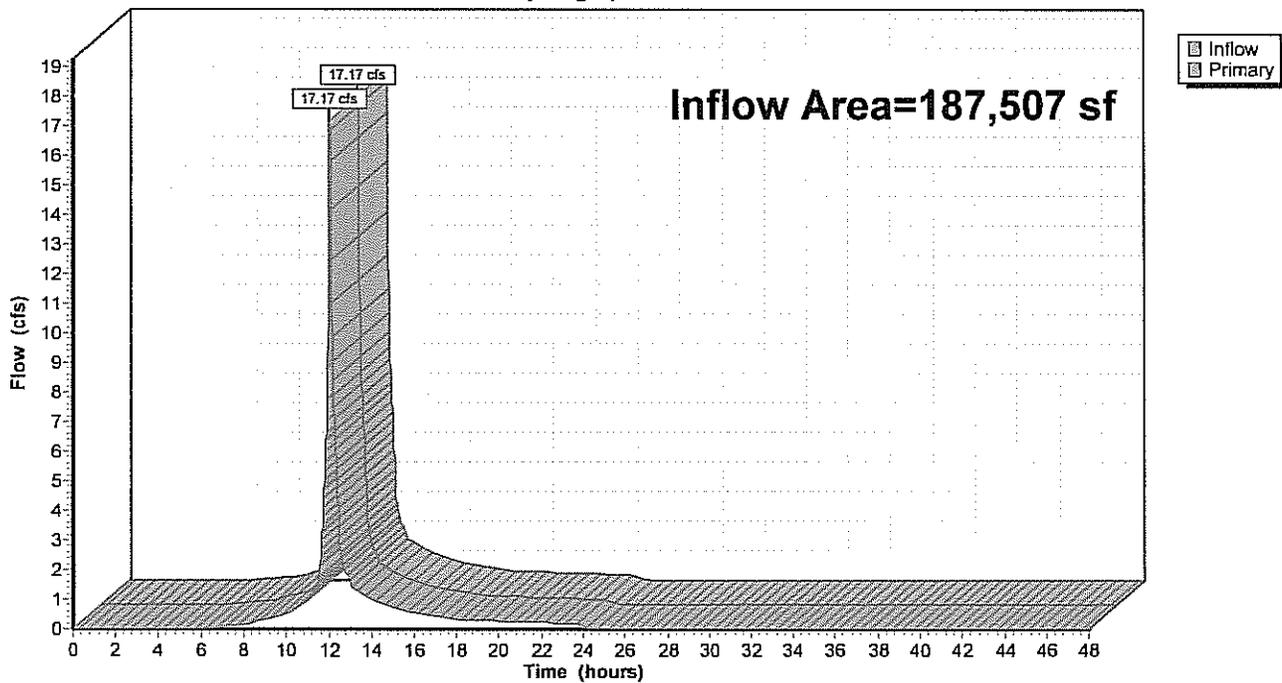
[40] Hint: Not Described (Outflow=Inflow)

Inflow Area = 187,507 sf, 61.29% Impervious, Inflow Depth = 3.48" for 10 YR event  
Inflow = 17.17 cfs @ 12.09 hrs, Volume= 54,366 cf  
Primary = 17.17 cfs @ 12.09 hrs, Volume= 54,366 cf, Atten= 0%, Lag= 0.0 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.02 hrs

### Pond AP-3: OFFSITE (18" CMP DRAIN)

Hydrograph



### Summary for Pond AP-4: WET-2

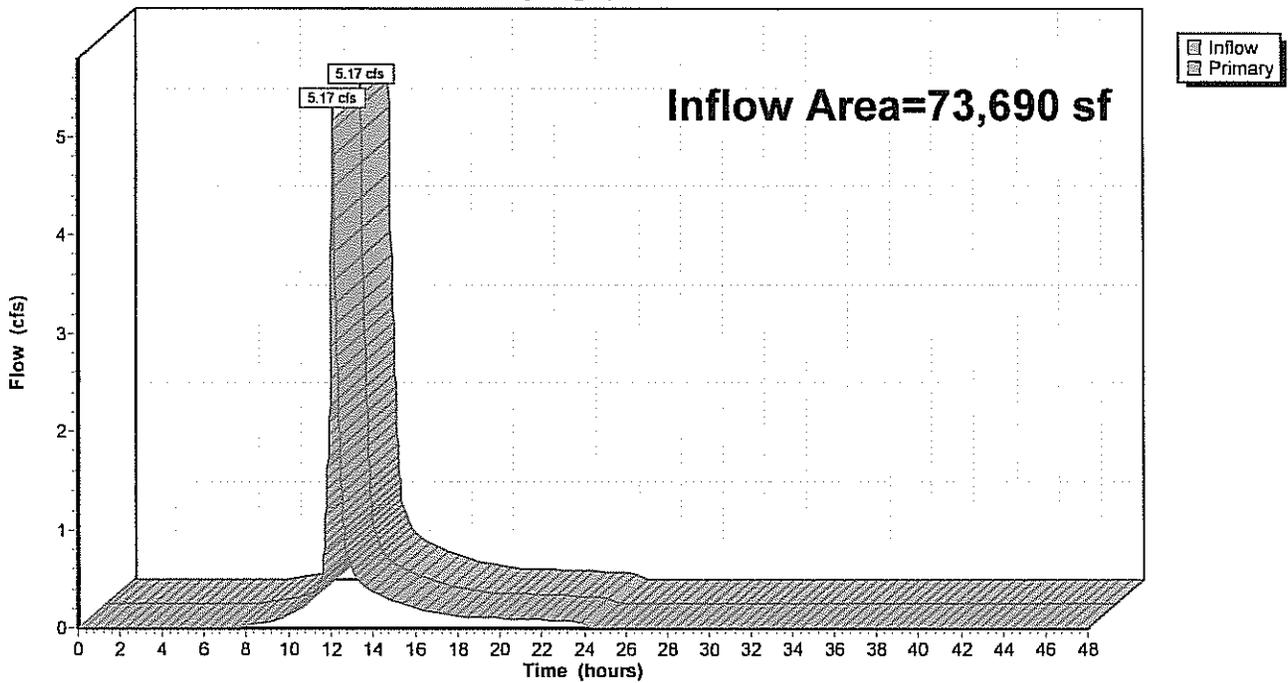
[40] Hint: Not Described (Outflow=Inflow)

Inflow Area = 73,690 sf, 38.79% Impervious, Inflow Depth = 2.99" for 10 YR event  
Inflow = 5.17 cfs @ 12.14 hrs, Volume= 18,384 cf  
Primary = 5.17 cfs @ 12.14 hrs, Volume= 18,384 cf, Atten= 0%, Lag= 0.0 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.02 hrs

### Pond AP-4: WET-2

Hydrograph



### Summary for Pond AP-5: WET-3

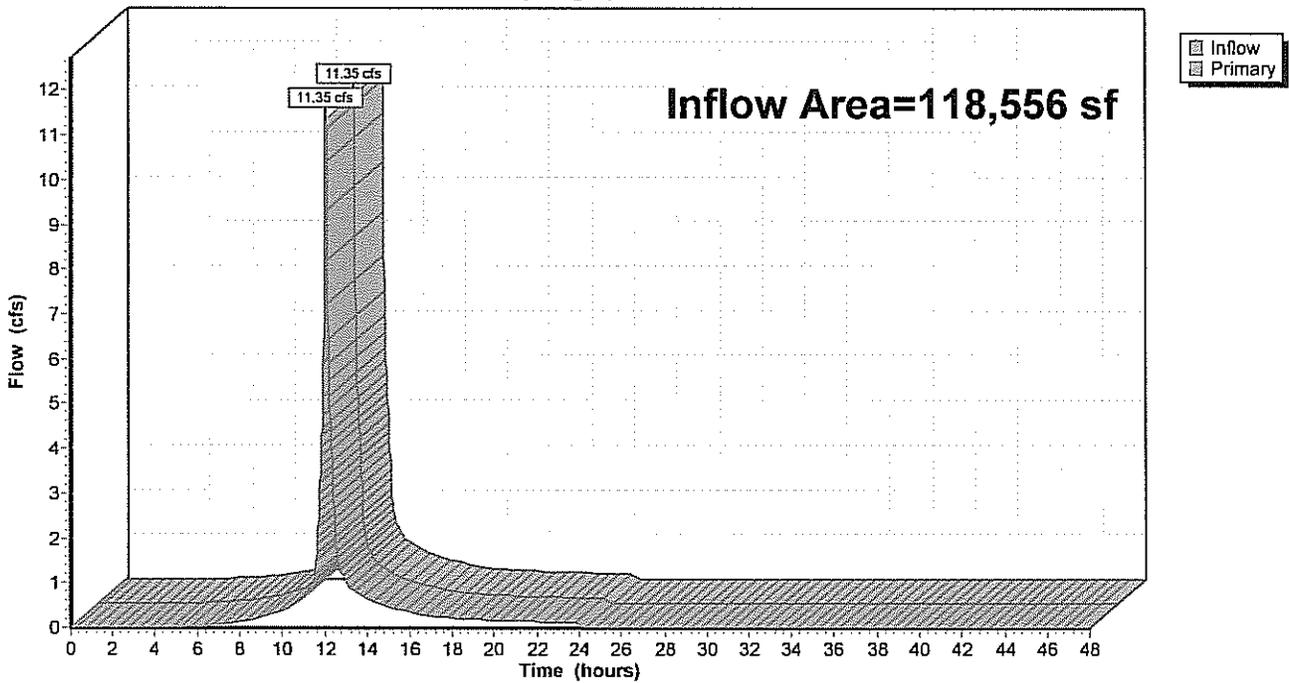
[40] Hint: Not Described (Outflow=Inflow)

Inflow Area = 118,556 sf, 67.97% Impervious, Inflow Depth = 3.68" for 10 YR event  
Inflow = 11.35 cfs @ 12.09 hrs, Volume= 36,394 cf  
Primary = 11.35 cfs @ 12.09 hrs, Volume= 36,394 cf, Atten= 0%, Lag= 0.0 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.02 hrs

### Pond AP-5: WET-3

Hydrograph



**1998-PRE-WS**

Type III 24-hr 25 YR Rainfall=5.60"

Prepared by Field Engineering Co. Inc.

Printed 5/7/2014

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Time span=0.00-48.00 hrs, dt=0.02 hrs, 2401 points  
 Runoff by SCS TR-20 method, UH=SCS, Weighted-CN  
 Reach routing by Dyn-Stor-Ind method - Pond routing by Dyn-Stor-Ind method

<b>Subcatchment PRE-A: Pre Development</b>	Runoff Area=34,534 sf 91.04% Impervious Runoff Depth=5.13" Tc=6.0 min CN=96 Runoff=4.28 cfs 14,761 cf
<b>Subcatchment PRE-B: Pre Development</b>	Runoff Area=68,997 sf 17.39% Impervious Runoff Depth=3.13" Tc=6.0 min CN=77 Runoff=5.81 cfs 18,010 cf
<b>Subcatchment PRE-C: Pre Development</b>	Runoff Area=187,507 sf 61.29% Impervious Runoff Depth=4.24" Tc=6.0 min CN=88 Runoff=20.74 cfs 66,277 cf
<b>Subcatchment PRE-D: Pre Development</b>	Runoff Area=73,690 sf 38.79% Impervious Runoff Depth=3.72" Tc=10.0 min CN=83 Runoff=6.39 cfs 22,854 cf
<b>Subcatchment PRE-E: Pre Development</b>	Runoff Area=118,556 sf 67.97% Impervious Runoff Depth=4.46" Tc=6.0 min CN=90 Runoff=13.60 cfs 44,033 cf
<b>Pond AP-1: WET-8</b>	Inflow=4.28 cfs 14,761 cf Primary=4.28 cfs 14,761 cf
<b>Pond AP-2: WET-1</b>	Inflow=5.81 cfs 18,010 cf Primary=5.81 cfs 18,010 cf
<b>Pond AP-3: OFFSITE (18" CMP DRAIN)</b>	Inflow=20.74 cfs 66,277 cf Primary=20.74 cfs 66,277 cf
<b>Pond AP-4: WET-2</b>	Inflow=6.39 cfs 22,854 cf Primary=6.39 cfs 22,854 cf
<b>Pond AP-5: WET-3</b>	Inflow=13.60 cfs 44,033 cf Primary=13.60 cfs 44,033 cf

**Total Runoff Area = 483,284 sf Runoff Volume = 165,935 cf Average Runoff Depth = 4.12"**  
**44.64% Pervious = 215,744 sf 55.36% Impervious = 267,540 sf**

**Summary for Subcatchment PRE-A: Pre Development Area A**

Runoff = 4.28 cfs @ 12.08 hrs, Volume= 14,761 cf, Depth= 5.13"

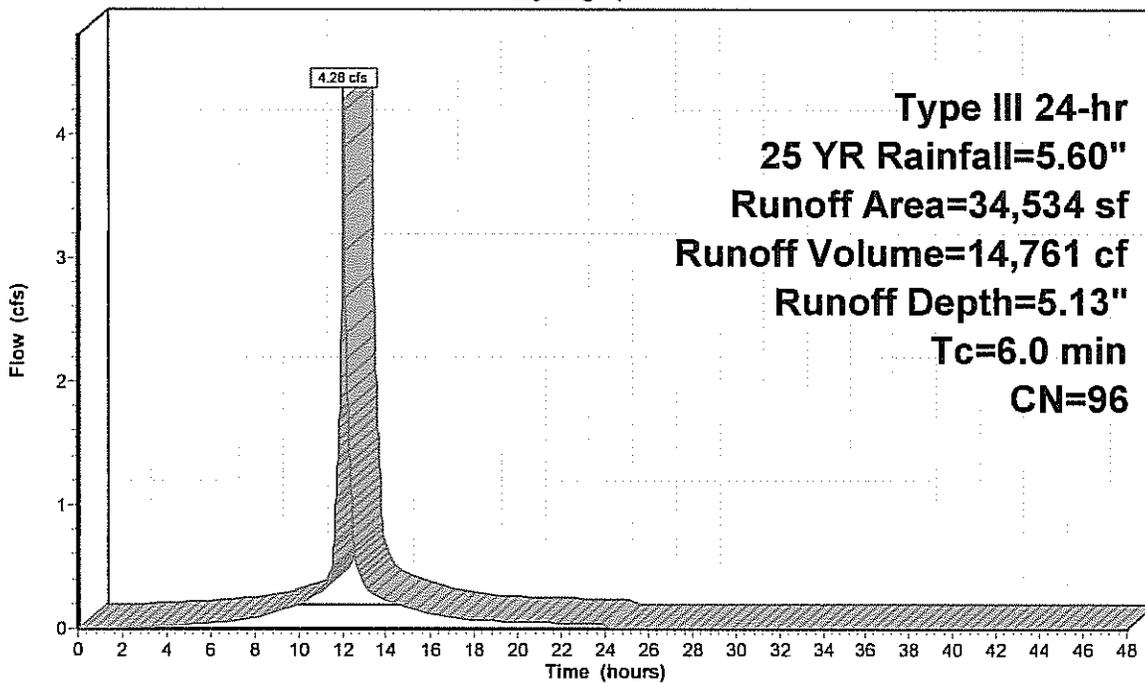
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.02 hrs  
 Type III 24-hr 25 YR Rainfall=5.60"

Area (sf)	CN	Description
31,441	98	Paved parking, HSG C
3,093	74	>75% Grass cover, Good, HSG C
34,534	96	Weighted Average
3,093		8.96% Pervious Area
31,441		91.04% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					Direct Entry,

**Subcatchment PRE-A: Pre Development Area A**

Hydrograph



Runoff

**Type III 24-hr  
 25 YR Rainfall=5.60"  
 Runoff Area=34,534 sf  
 Runoff Volume=14,761 cf  
 Runoff Depth=5.13"  
 Tc=6.0 min  
 CN=96**

**Summary for Subcatchment PRE-B: Pre Development Area B**

Runoff = 5.81 cfs @ 12.09 hrs, Volume= 18,010 cf, Depth= 3.13"

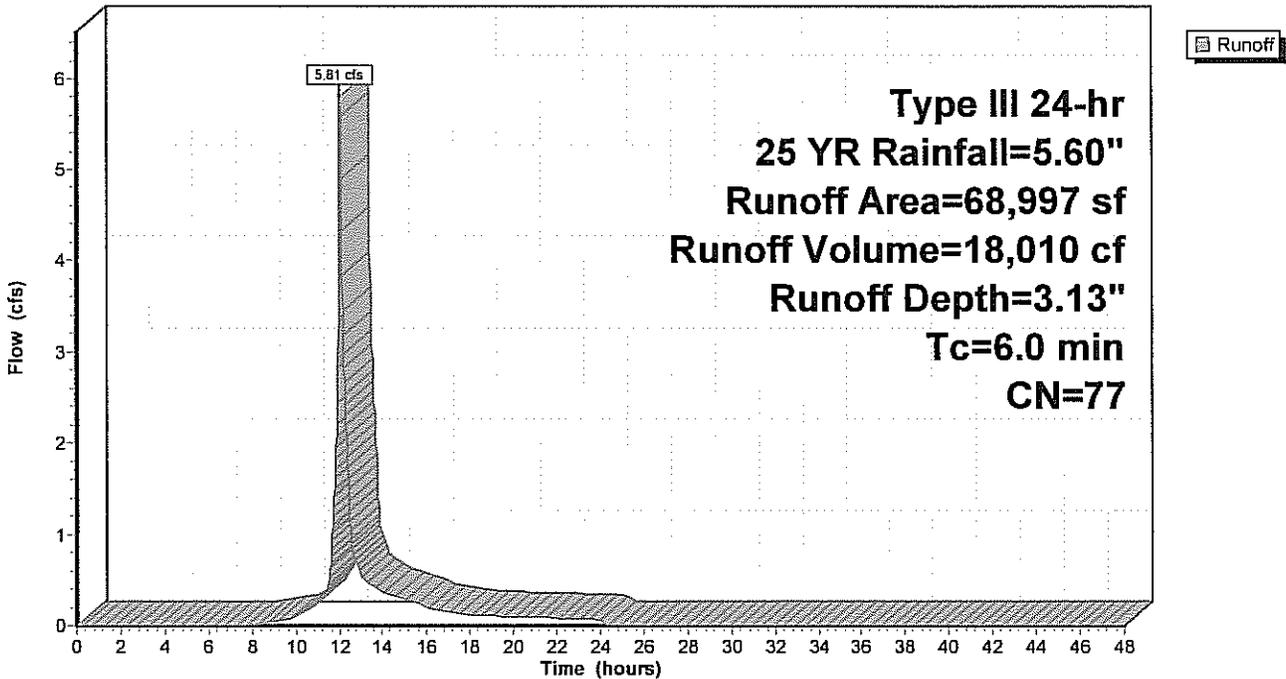
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.02 hrs  
 Type III 24-hr 25 YR Rainfall=5.60"

Area (sf)	CN	Description
11,997	98	Paved parking, HSG C
57,000	72	Woods/grass comb., Good, HSG C
68,997	77	Weighted Average
57,000		82.61% Pervious Area
11,997		17.39% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					Direct Entry,

**Subcatchment PRE-B: Pre Development Area B**

Hydrograph



**Summary for Subcatchment PRE-C: Pre Development Area C**

Runoff = 20.74 cfs @ 12.09 hrs, Volume= 66,277 cf, Depth= 4.24"

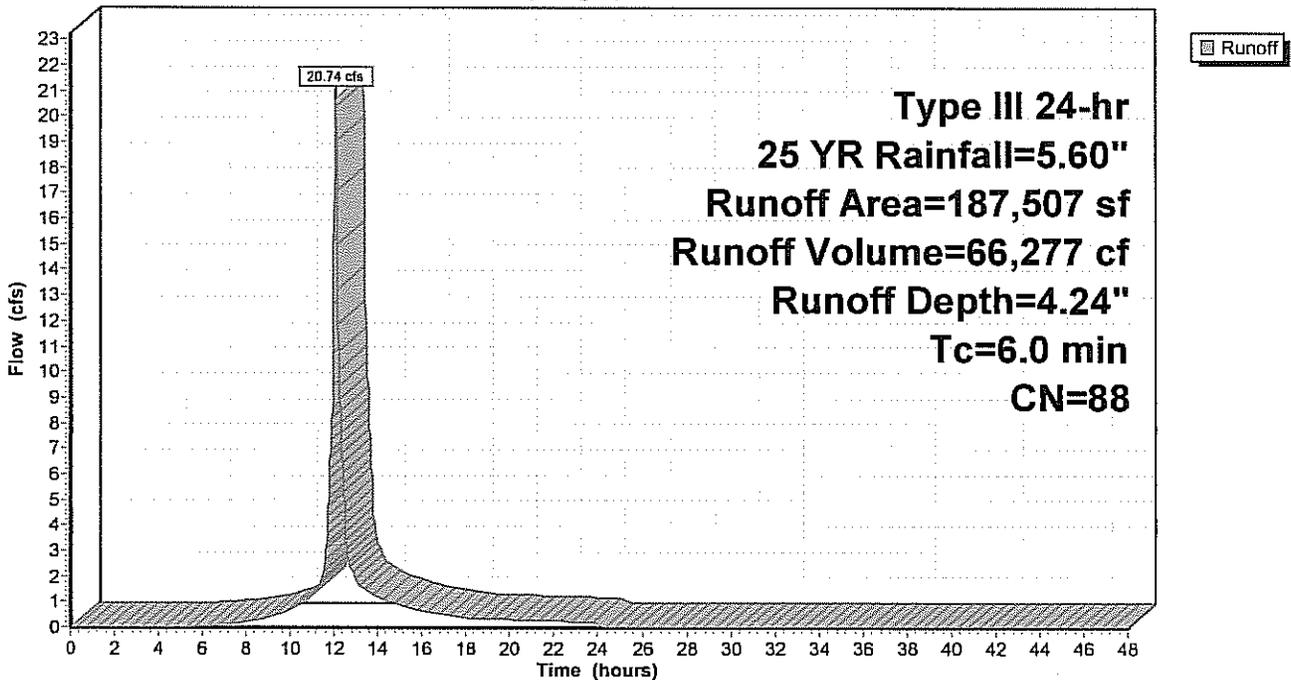
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.02 hrs  
 Type III 24-hr 25 YR Rainfall=5.60"

Area (sf)	CN	Description
37,512	98	Paved parking, HSG C
77,417	98	Roofs, HSG C
72,578	72	Woods/grass comb., Good, HSG C
187,507	88	Weighted Average
72,578		38.71% Pervious Area
114,929		61.29% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					Direct Entry,

**Subcatchment PRE-C: Pre Development Area C**

Hydrograph



**Summary for Subcatchment PRE-D: Pre Development Area D**

Runoff = 6.39 cfs @ 12.14 hrs, Volume= 22,854 cf, Depth= 3.72"

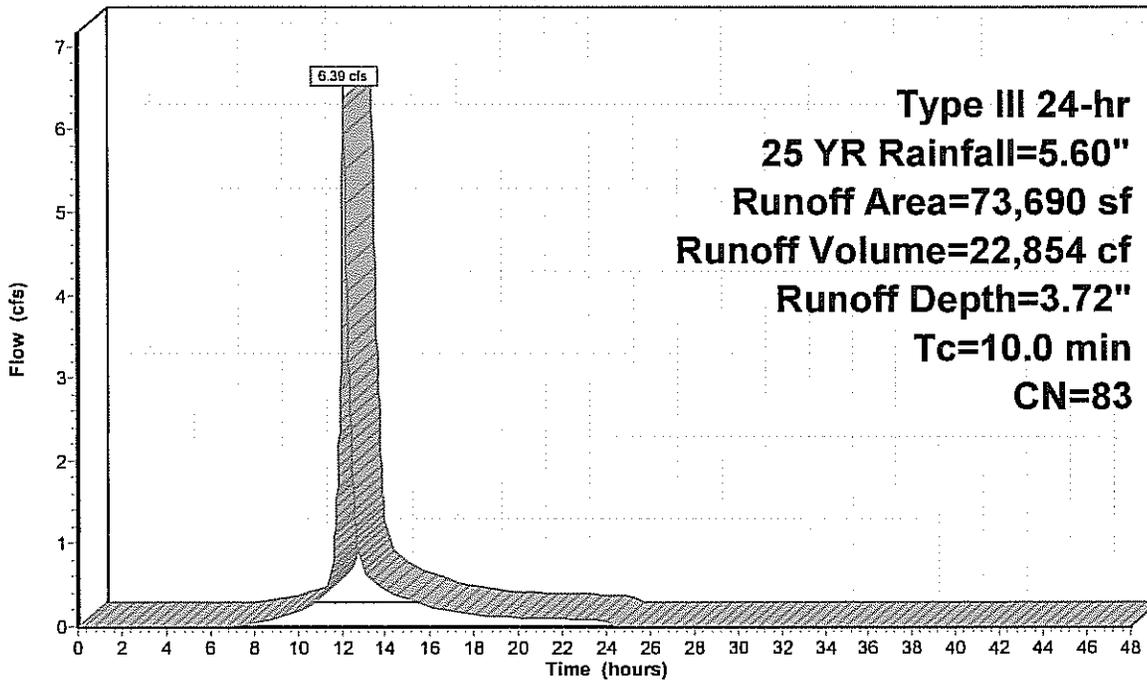
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.02 hrs  
 Type III 24-hr 25 YR Rainfall=5.60"

Area (sf)	CN	Description
13,635	98	Paved parking, HSG C
45,105	74	>75% Grass cover, Good, HSG C
14,950	98	Roofs, HSG C
73,690	83	Weighted Average
45,105		61.21% Pervious Area
28,585		38.79% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
10.0					Direct Entry,

**Subcatchment PRE-D: Pre Development Area D**

Hydrograph



Runoff

**Summary for Subcatchment PRE-E: Pre Development Area E**

Runoff = 13.60 cfs @ 12.08 hrs, Volume= 44,033 cf, Depth= 4.46"

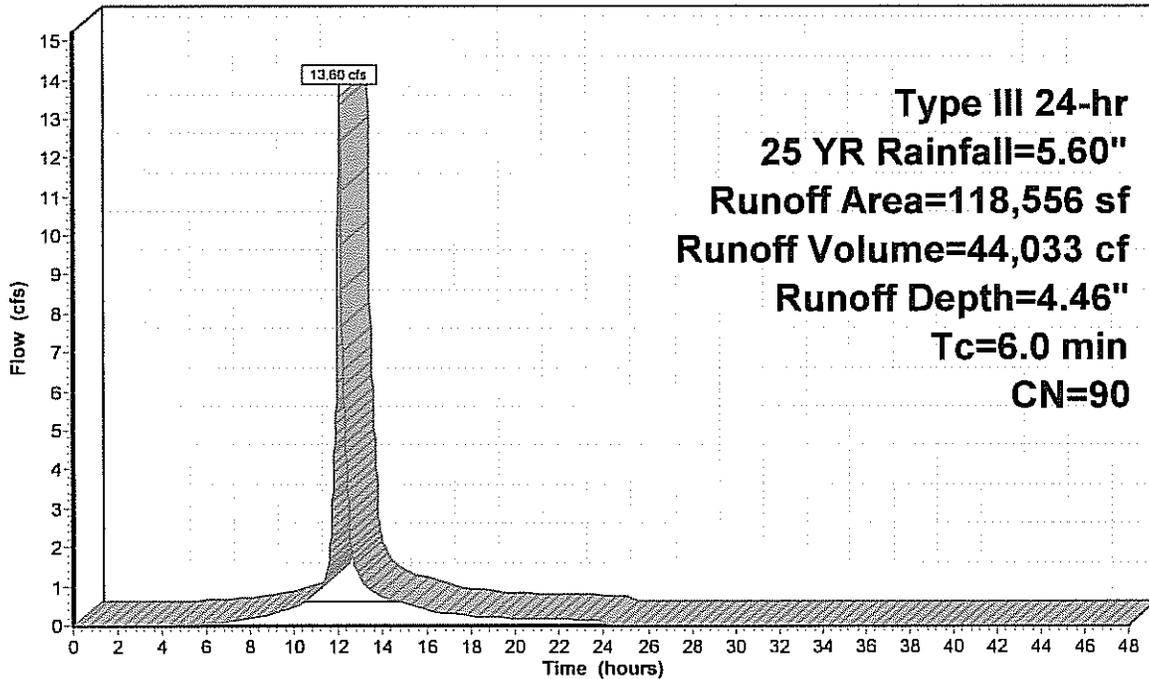
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.02 hrs  
 Type III 24-hr 25 YR Rainfall=5.60"

Area (sf)	CN	Description
80,588	98	Paved parking, HSG C
37,968	72	Woods/grass comb., Good, HSG C
118,556	90	Weighted Average
37,968		32.03% Pervious Area
80,588		67.97% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					Direct Entry,

**Subcatchment PRE-E: Pre Development Area E**

Hydrograph



### Summary for Pond AP-1: WET-8

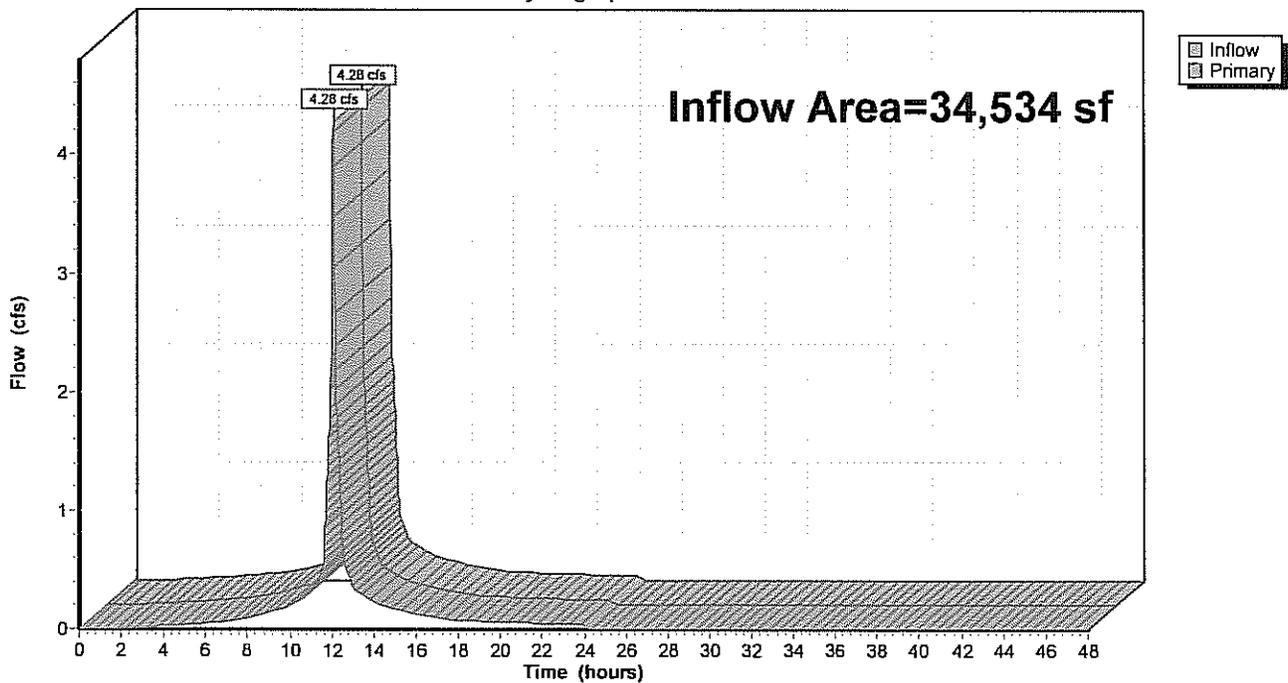
[40] Hint: Not Described (Outflow=Inflow)

Inflow Area = 34,534 sf, 91.04% Impervious, Inflow Depth = 5.13" for 25 YR event  
Inflow = 4.28 cfs @ 12.08 hrs, Volume= 14,761 cf  
Primary = 4.28 cfs @ 12.08 hrs, Volume= 14,761 cf, Atten= 0%, Lag= 0.0 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.02 hrs

### Pond AP-1: WET-8

Hydrograph



### Summary for Pond AP-2: WET-1

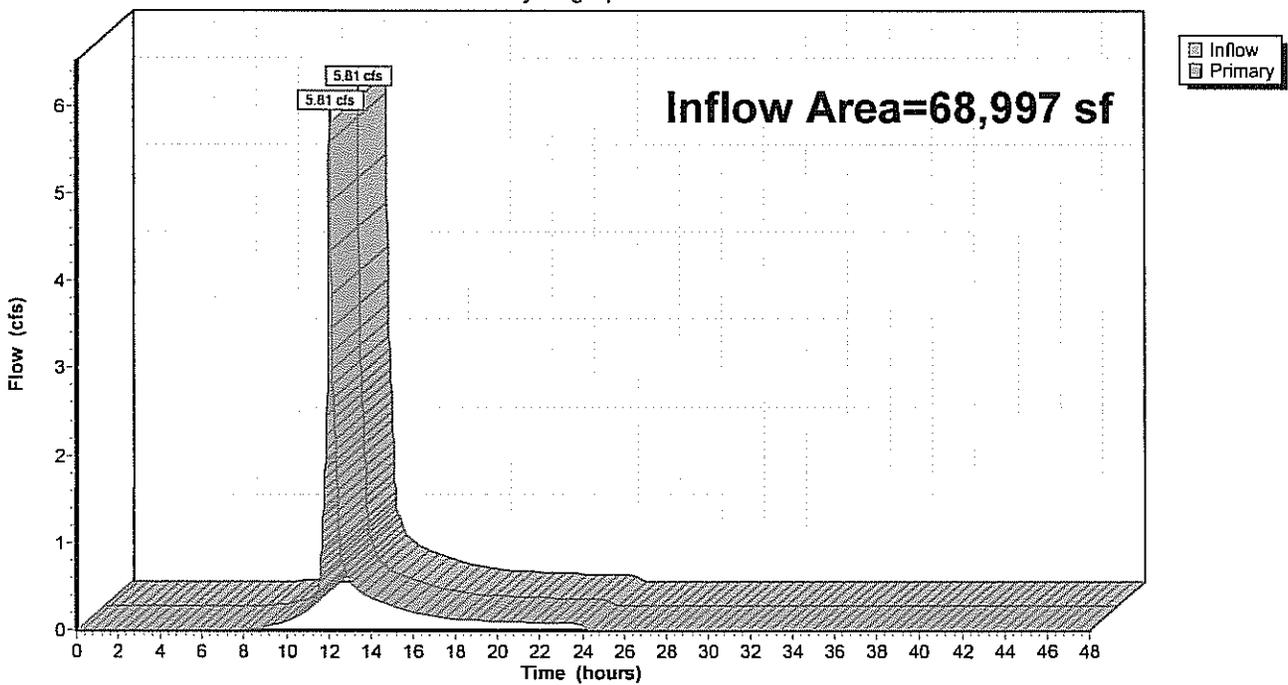
[40] Hint: Not Described (Outflow=Inflow)

Inflow Area = 68,997 sf, 17.39% Impervious, Inflow Depth = 3.13" for 25 YR event  
Inflow = 5.81 cfs @ 12.09 hrs, Volume= 18,010 cf  
Primary = 5.81 cfs @ 12.09 hrs, Volume= 18,010 cf, Atten= 0%, Lag= 0.0 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.02 hrs

### Pond AP-2: WET-1

Hydrograph



### Summary for Pond AP-3: OFFSITE (18" CMP DRAIN)

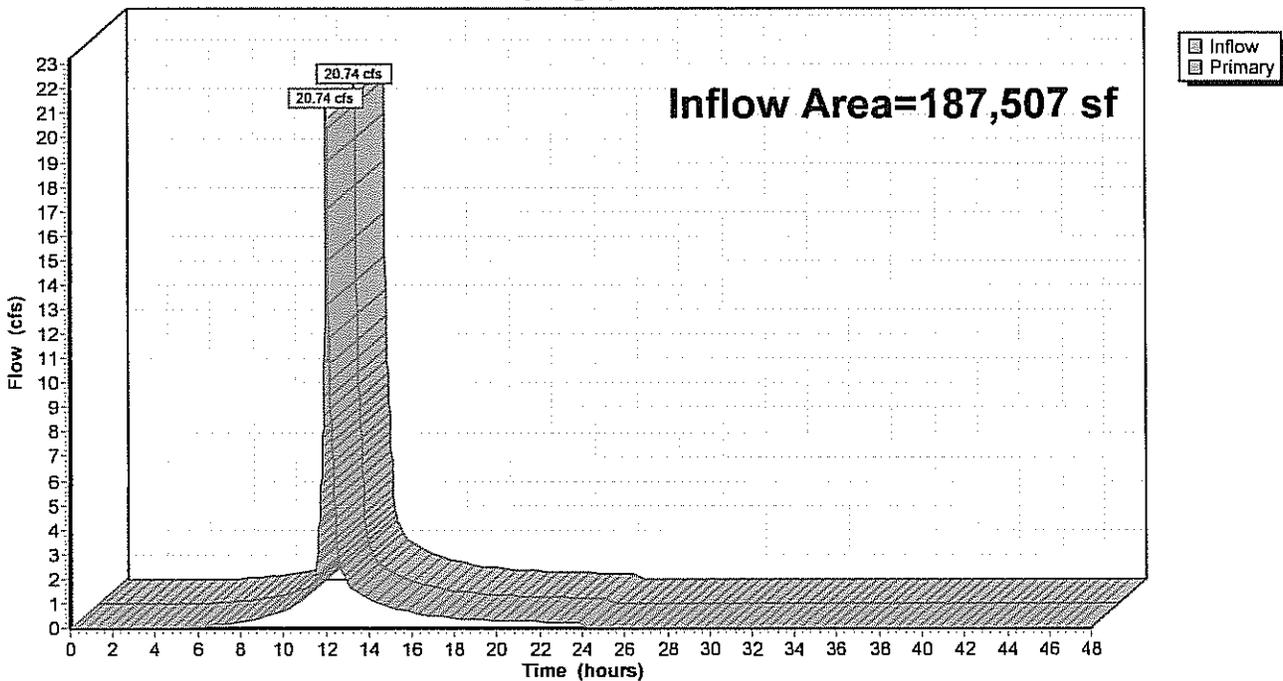
[40] Hint: Not Described (Outflow=Inflow)

Inflow Area = 187,507 sf, 61.29% Impervious, Inflow Depth = 4.24" for 25 YR event  
Inflow = 20.74 cfs @ 12.09 hrs, Volume= 66,277 cf  
Primary = 20.74 cfs @ 12.09 hrs, Volume= 66,277 cf, Atten= 0%, Lag= 0.0 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.02 hrs

### Pond AP-3: OFFSITE (18" CMP DRAIN)

Hydrograph



### Summary for Pond AP-4: WET-2

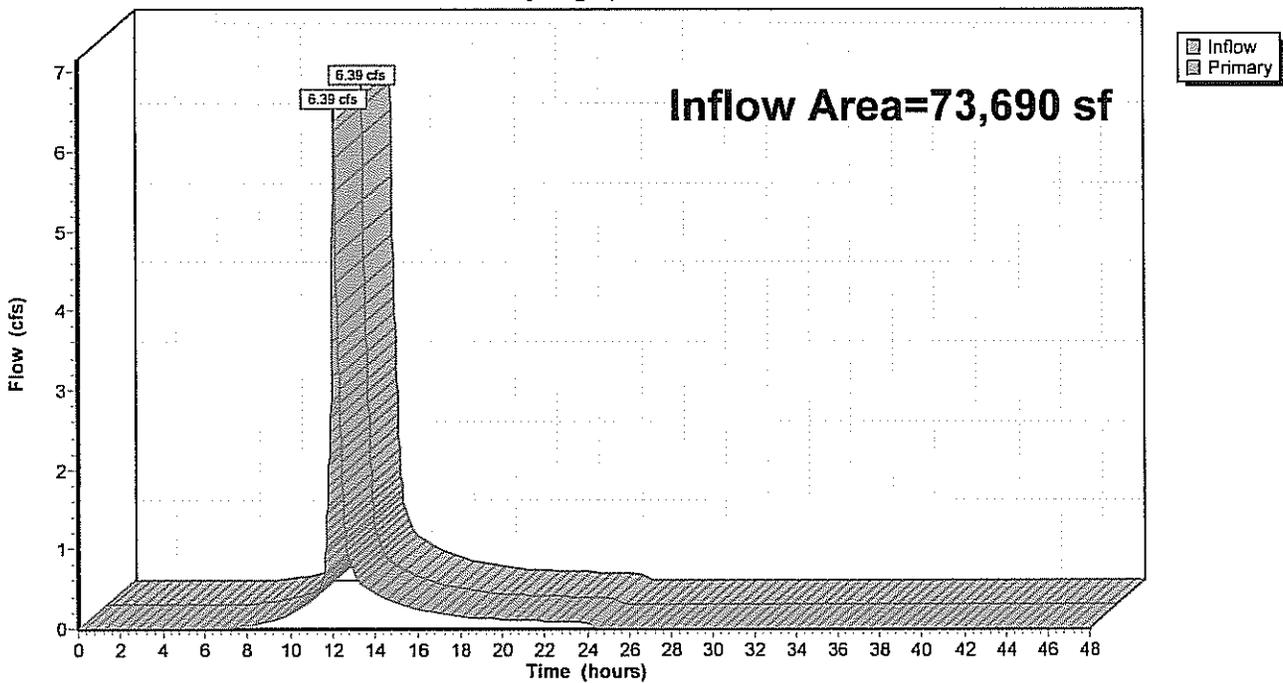
[40] Hint: Not Described (Outflow=Inflow)

Inflow Area = 73,690 sf, 38.79% Impervious, Inflow Depth = 3.72" for 25 YR event  
Inflow = 6.39 cfs @ 12.14 hrs, Volume= 22,854 cf  
Primary = 6.39 cfs @ 12.14 hrs, Volume= 22,854 cf, Atten= 0%, Lag= 0.0 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.02 hrs

### Pond AP-4: WET-2

Hydrograph



### Summary for Pond AP-5: WET-3

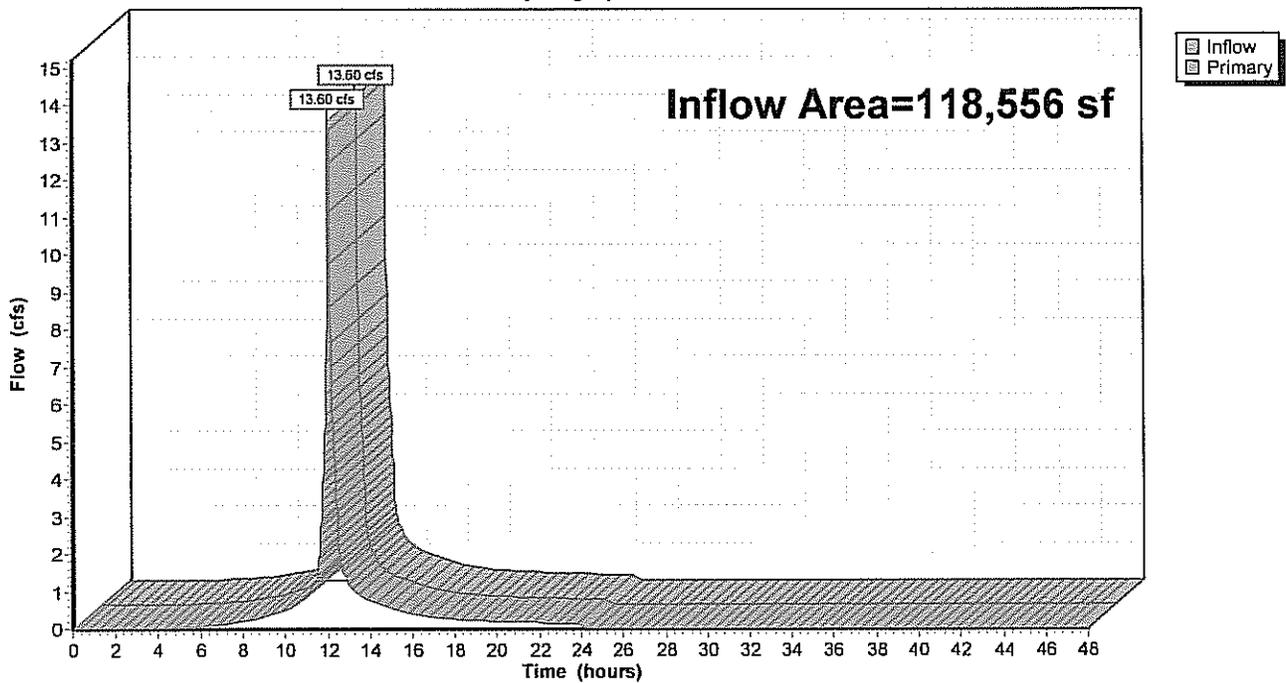
[40] Hint: Not Described (Outflow=Inflow)

Inflow Area = 118,556 sf, 67.97% Impervious, Inflow Depth = 4.46" for 25 YR event  
Inflow = 13.60 cfs @ 12.08 hrs, Volume= 44,033 cf  
Primary = 13.60 cfs @ 12.08 hrs, Volume= 44,033 cf, Atten= 0%, Lag= 0.0 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.02 hrs

### Pond AP-5: WET-3

Hydrograph



**1998-PRE-WS**

Type III 24-hr 100 YR Rainfall=7.00"

Prepared by Field Engineering Co. Inc.

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Time span=0.00-48.00 hrs, dt=0.02 hrs, 2401 points  
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN  
Reach routing by Dyn-Stor-Ind method - Pond routing by Dyn-Stor-Ind method

<b>Subcatchment PRE-A: Pre Development</b>	Runoff Area=34,534 sf 91.04% Impervious	Runoff Depth=6.52"
	Tc=6.0 min CN=96	Runoff=5.39 cfs 18,774 cf
<b>Subcatchment PRE-B: Pre Development</b>	Runoff Area=68,997 sf 17.39% Impervious	Runoff Depth=4.37"
	Tc=6.0 min CN=77	Runoff=8.07 cfs 25,102 cf
<b>Subcatchment PRE-C: Pre Development</b>	Runoff Area=187,507 sf 61.29% Impervious	Runoff Depth=5.59"
	Tc=6.0 min CN=88	Runoff=26.96 cfs 87,401 cf
<b>Subcatchment PRE-D: Pre Development</b>	Runoff Area=73,690 sf 38.79% Impervious	Runoff Depth=5.03"
	Tc=10.0 min CN=83	Runoff=8.55 cfs 30,875 cf
<b>Subcatchment PRE-E: Pre Development</b>	Runoff Area=118,556 sf 67.97% Impervious	Runoff Depth=5.82"
	Tc=6.0 min CN=90	Runoff=17.50 cfs 57,531 cf
<b>Pond AP-1: WET-8</b>		Inflow=5.39 cfs 18,774 cf Primary=5.39 cfs 18,774 cf
<b>Pond AP-2: WET-1</b>		Inflow=8.07 cfs 25,102 cf Primary=8.07 cfs 25,102 cf
<b>Pond AP-3: OFFSITE (18" CMP DRAIN)</b>		Inflow=26.96 cfs 87,401 cf Primary=26.96 cfs 87,401 cf
<b>Pond AP-4: WET-2</b>		Inflow=8.55 cfs 30,875 cf Primary=8.55 cfs 30,875 cf
<b>Pond AP-5: WET-3</b>		Inflow=17.50 cfs 57,531 cf Primary=17.50 cfs 57,531 cf

**Total Runoff Area = 483,284 sf Runoff Volume = 219,683 cf Average Runoff Depth = 5.45"**  
**44.64% Pervious = 215,744 sf 55.36% Impervious = 267,540 sf**

**Summary for Subcatchment PRE-A: Pre Development Area A**

Runoff = 5.39 cfs @ 12.08 hrs, Volume= 18,774 cf, Depth= 6.52"

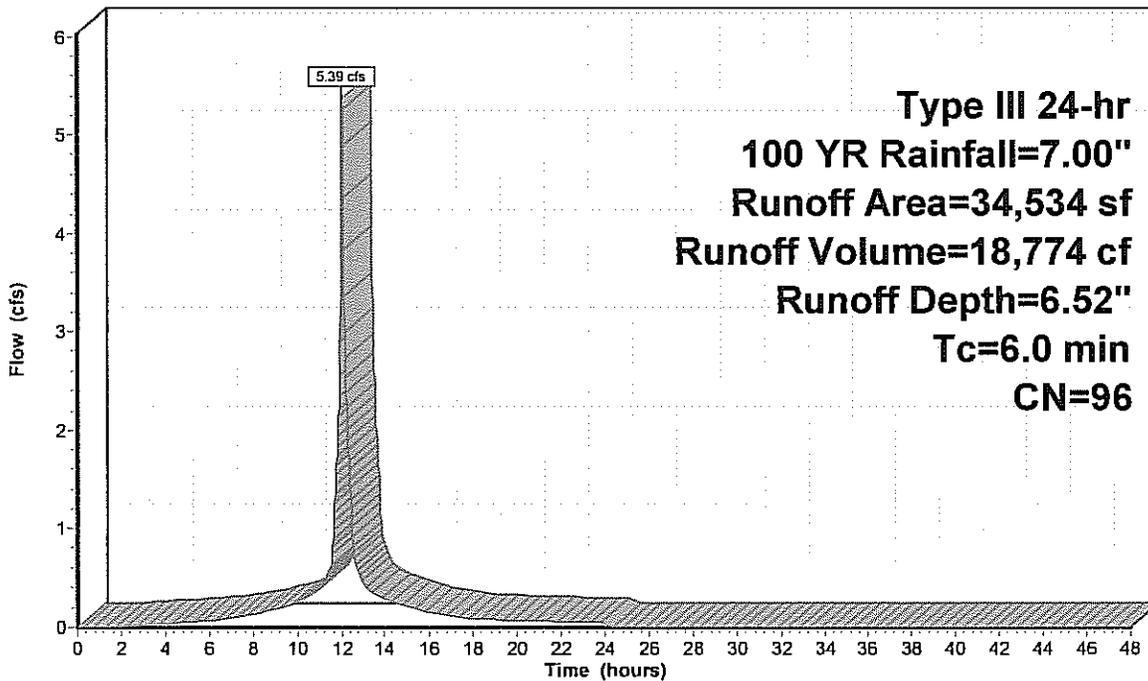
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.02 hrs  
 Type III 24-hr 100 YR Rainfall=7.00"

Area (sf)	CN	Description
31,441	98	Paved parking, HSG C
3,093	74	>75% Grass cover, Good, HSG C
34,534	96	Weighted Average
3,093		8.96% Pervious Area
31,441		91.04% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					Direct Entry,

**Subcatchment PRE-A: Pre Development Area A**

Hydrograph



Runoff

**Summary for Subcatchment PRE-B: Pre Development Area B**

Runoff = 8.07 cfs @ 12.09 hrs, Volume= 25,102 cf, Depth= 4.37"

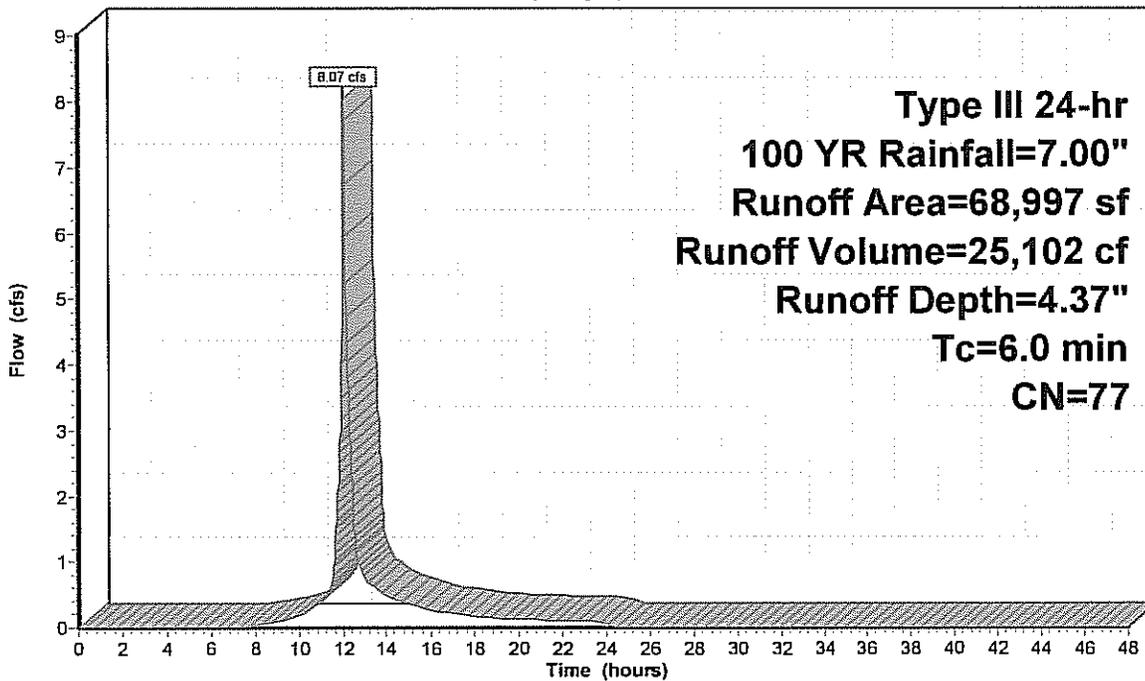
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.02 hrs  
 Type III 24-hr 100 YR Rainfall=7.00"

Area (sf)	CN	Description
11,997	98	Paved parking, HSG C
57,000	72	Woods/grass comb., Good, HSG C
68,997	77	Weighted Average
57,000		82.61% Pervious Area
11,997		17.39% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					Direct Entry,

**Subcatchment PRE-B: Pre Development Area B**

Hydrograph



Runoff

**Type III 24-hr  
 100 YR Rainfall=7.00"  
 Runoff Area=68,997 sf  
 Runoff Volume=25,102 cf  
 Runoff Depth=4.37"  
 Tc=6.0 min  
 CN=77**

**Summary for Subcatchment PRE-C: Pre Development Area C**

Runoff = 26.96 cfs @ 12.08 hrs, Volume= 87,401 cf, Depth= 5.59"

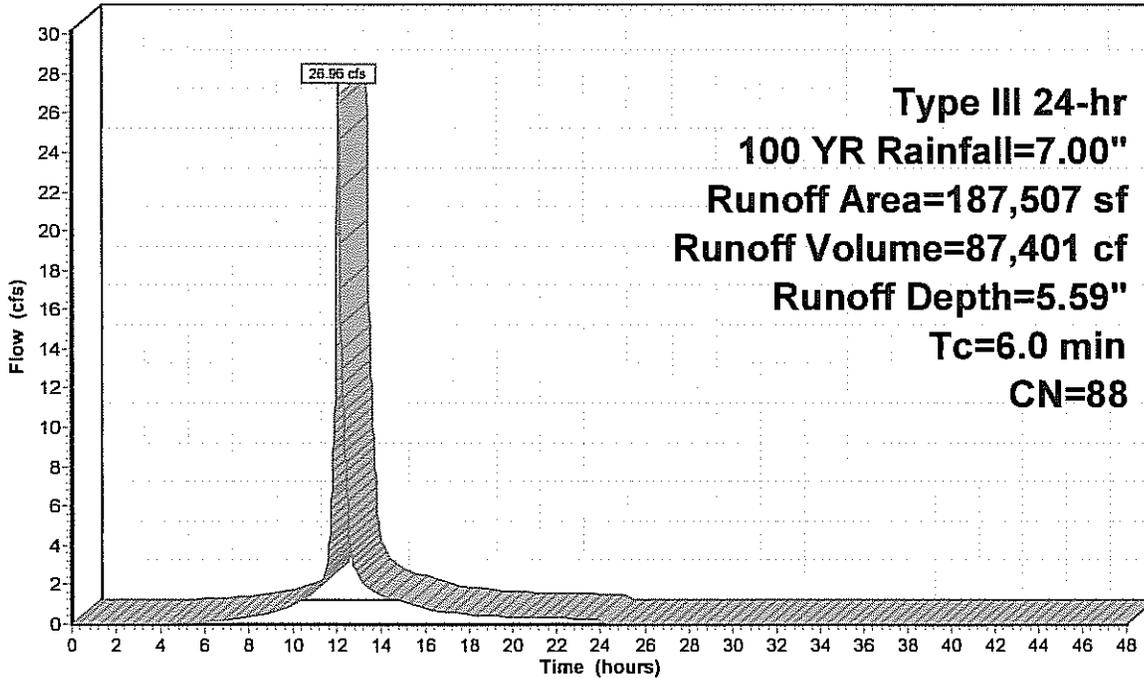
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.02 hrs  
 Type III 24-hr 100 YR Rainfall=7.00"

Area (sf)	CN	Description
37,512	98	Paved parking, HSG C
77,417	98	Roofs, HSG C
72,578	72	Woods/grass comb., Good, HSG C
187,507	88	Weighted Average
72,578		38.71% Pervious Area
114,929		61.29% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					Direct Entry,

**Subcatchment PRE-C: Pre Development Area C**

Hydrograph



Runoff

**Type III 24-hr  
 100 YR Rainfall=7.00"  
 Runoff Area=187,507 sf  
 Runoff Volume=87,401 cf  
 Runoff Depth=5.59"  
 Tc=6.0 min  
 CN=88**

**Summary for Subcatchment PRE-D: Pre Development Area D**

Runoff = 8.55 cfs @ 12.14 hrs, Volume= 30,875 cf, Depth= 5.03"

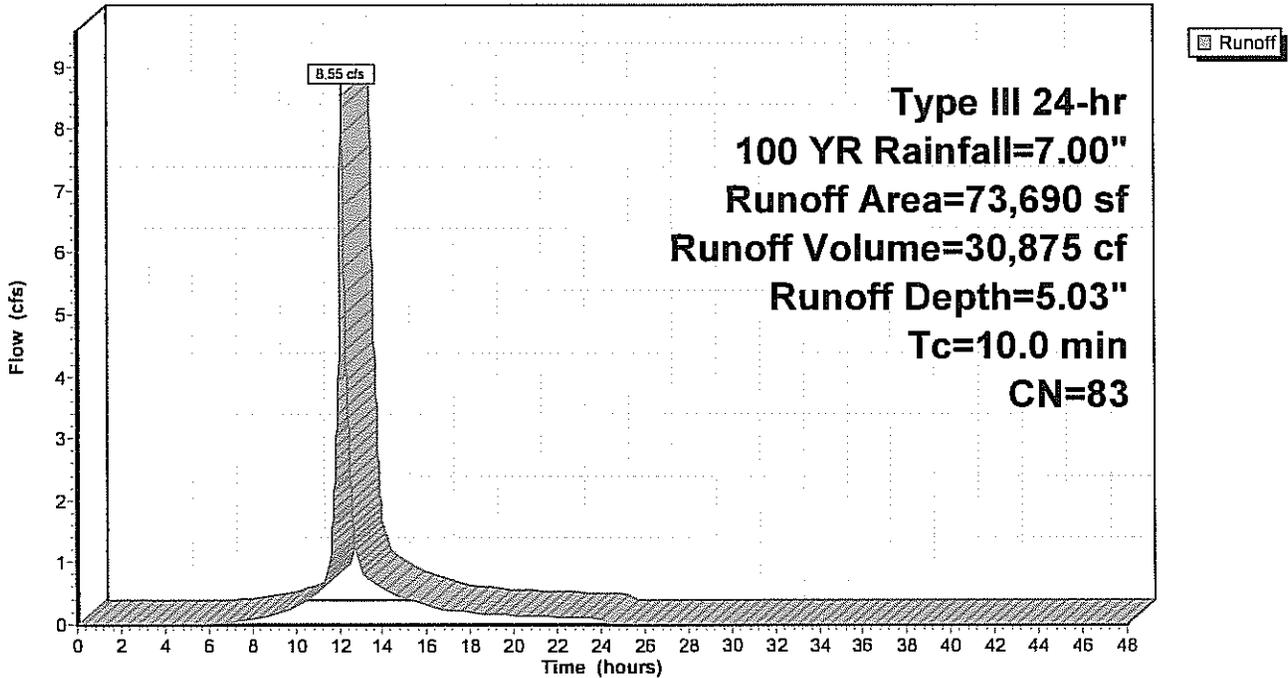
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.02 hrs  
 Type III 24-hr 100 YR Rainfall=7.00"

Area (sf)	CN	Description
13,635	98	Paved parking, HSG C
45,105	74	>75% Grass cover, Good, HSG C
14,950	98	Roofs, HSG C
73,690	83	Weighted Average
45,105		61.21% Pervious Area
28,585		38.79% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
10.0					Direct Entry,

**Subcatchment PRE-D: Pre Development Area D**

Hydrograph



**Summary for Subcatchment PRE-E: Pre Development Area E**

Runoff = 17.50 cfs @ 12.08 hrs, Volume= 57,531 cf, Depth= 5.82"

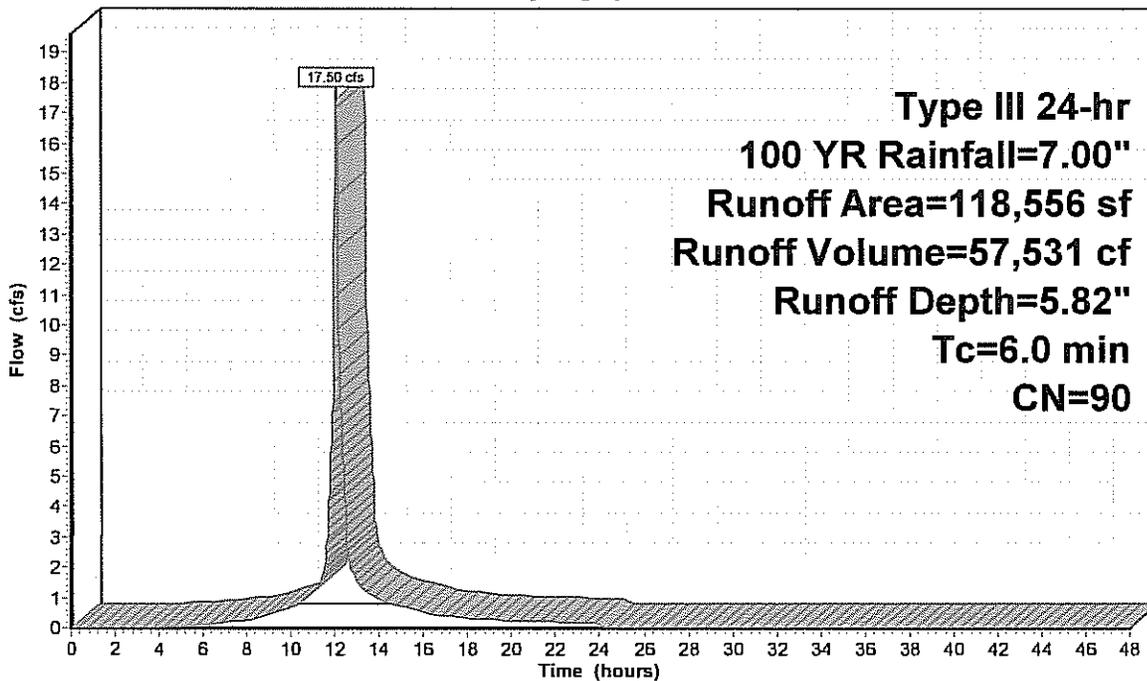
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.02 hrs  
 Type III 24-hr 100 YR Rainfall=7.00"

Area (sf)	CN	Description
80,588	98	Paved parking, HSG C
37,968	72	Woods/grass comb., Good, HSG C
118,556	90	Weighted Average
37,968		32.03% Pervious Area
80,588		67.97% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					Direct Entry,

**Subcatchment PRE-E: Pre Development Area E**

Hydrograph



Runoff

**Type III 24-hr  
 100 YR Rainfall=7.00"  
 Runoff Area=118,556 sf  
 Runoff Volume=57,531 cf  
 Runoff Depth=5.82"  
 Tc=6.0 min  
 CN=90**

### Summary for Pond AP-1: WET-8

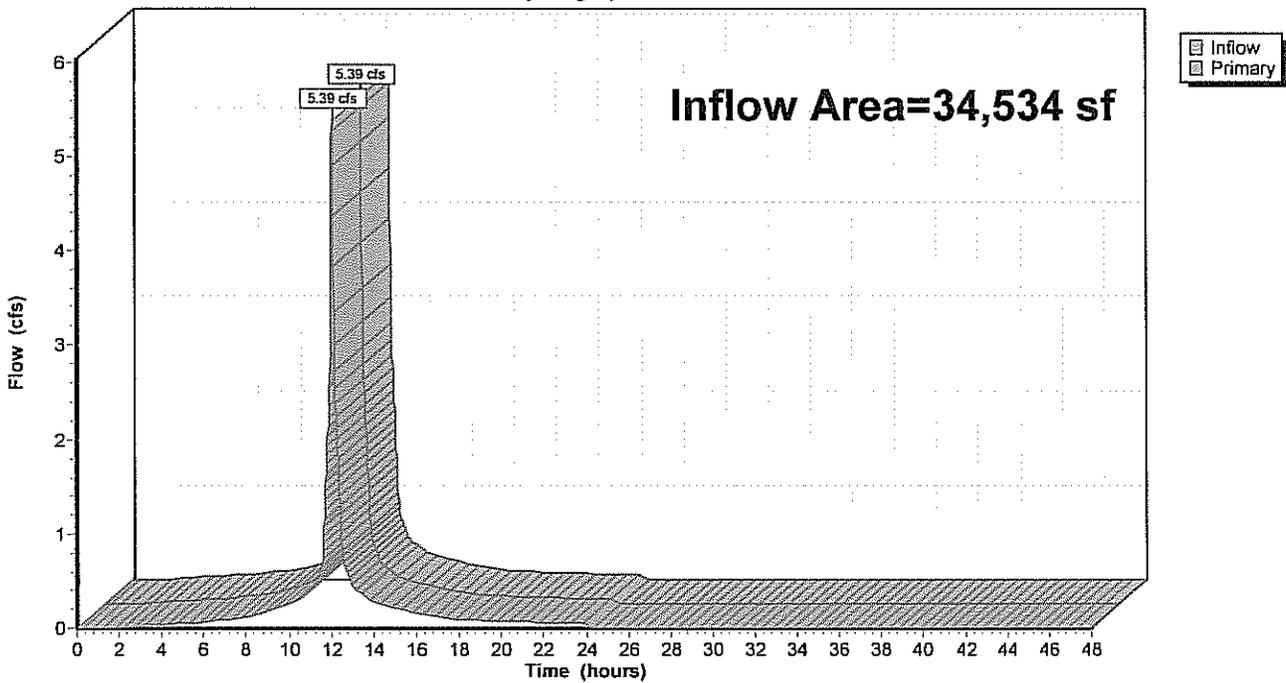
[40] Hint: Not Described (Outflow=Inflow)

Inflow Area = 34,534 sf, 91.04% Impervious, Inflow Depth = 6.52" for 100 YR event  
Inflow = 5.39 cfs @ 12.08 hrs, Volume= 18,774 cf  
Primary = 5.39 cfs @ 12.08 hrs, Volume= 18,774 cf, Atten= 0%, Lag= 0.0 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.02 hrs

### Pond AP-1: WET-8

Hydrograph



### Summary for Pond AP-2: WET-1

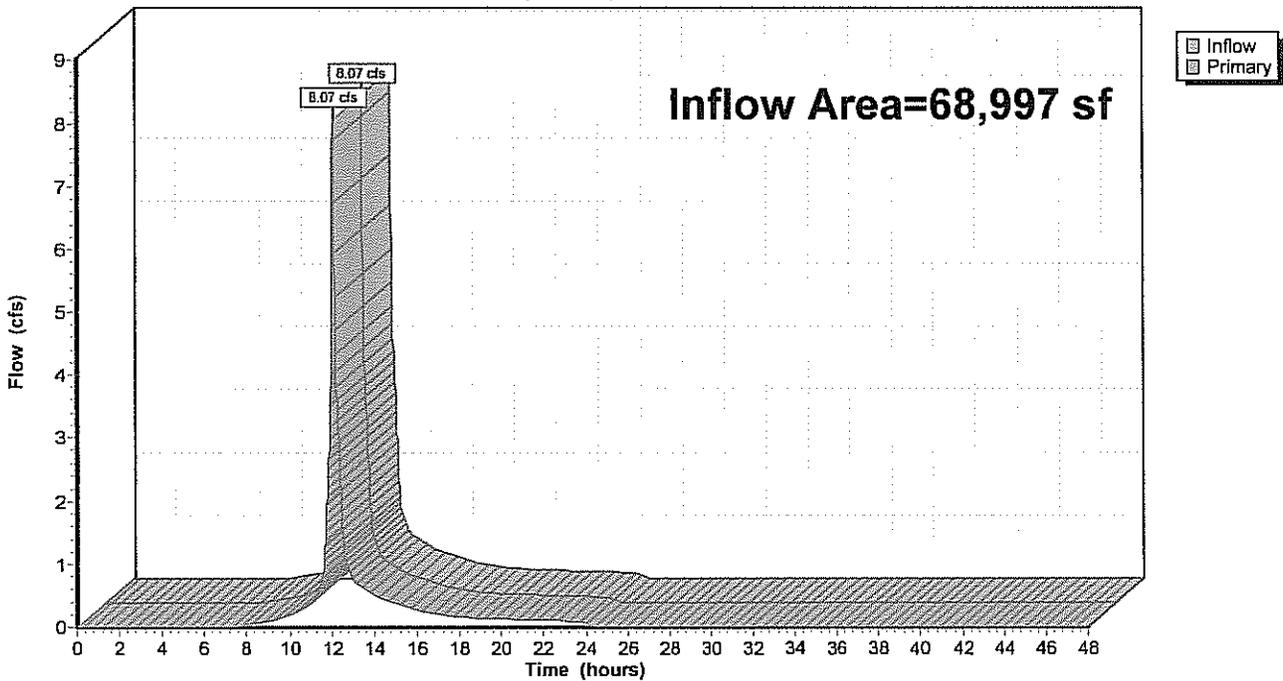
[40] Hint: Not Described (Outflow=Inflow)

Inflow Area = 68,997 sf, 17.39% Impervious, Inflow Depth = 4.37" for 100 YR event  
Inflow = 8.07 cfs @ 12.09 hrs, Volume= 25,102 cf  
Primary = 8.07 cfs @ 12.09 hrs, Volume= 25,102 cf, Atten= 0%, Lag= 0.0 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.02 hrs

### Pond AP-2: WET-1

Hydrograph



### Summary for Pond AP-3: OFFSITE (18" CMP DRAIN)

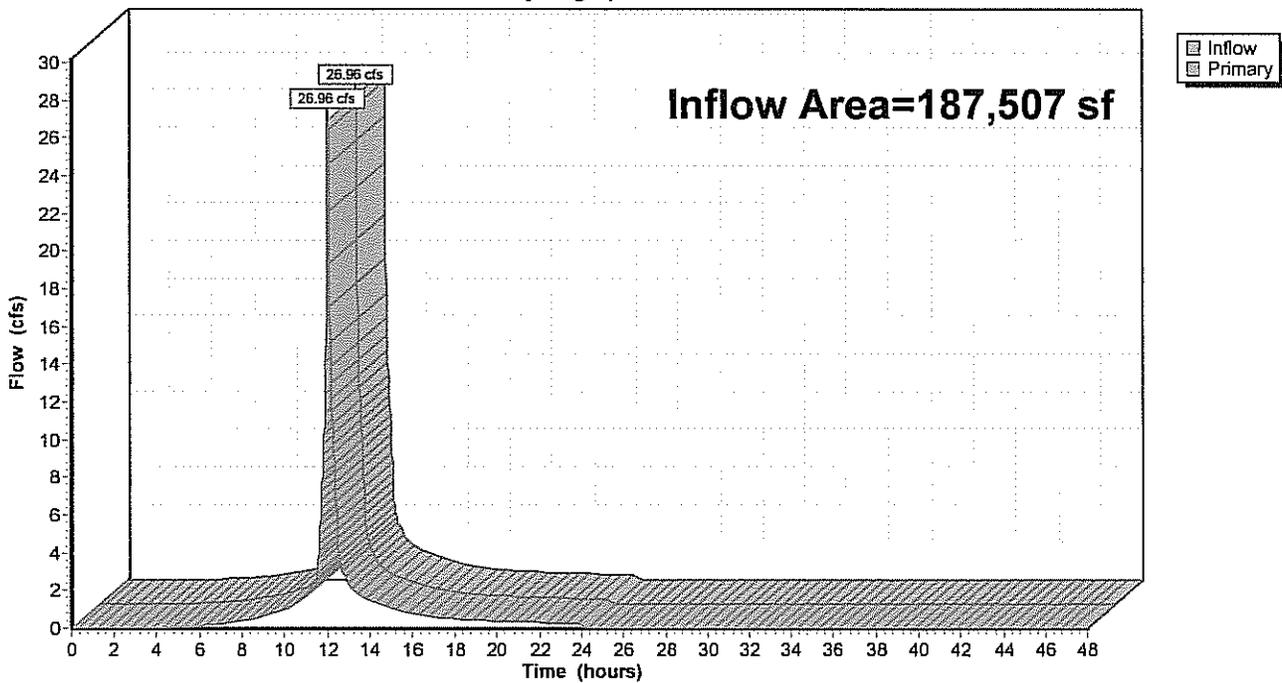
[40] Hint: Not Described (Outflow=Inflow)

Inflow Area = 187,507 sf, 61.29% Impervious, Inflow Depth = 5.59" for 100 YR event  
Inflow = 26.96 cfs @ 12.08 hrs, Volume= 87,401 cf  
Primary = 26.96 cfs @ 12.08 hrs, Volume= 87,401 cf, Atten= 0%, Lag= 0.0 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.02 hrs

### Pond AP-3: OFFSITE (18" CMP DRAIN)

Hydrograph



### Summary for Pond AP-4: WET-2

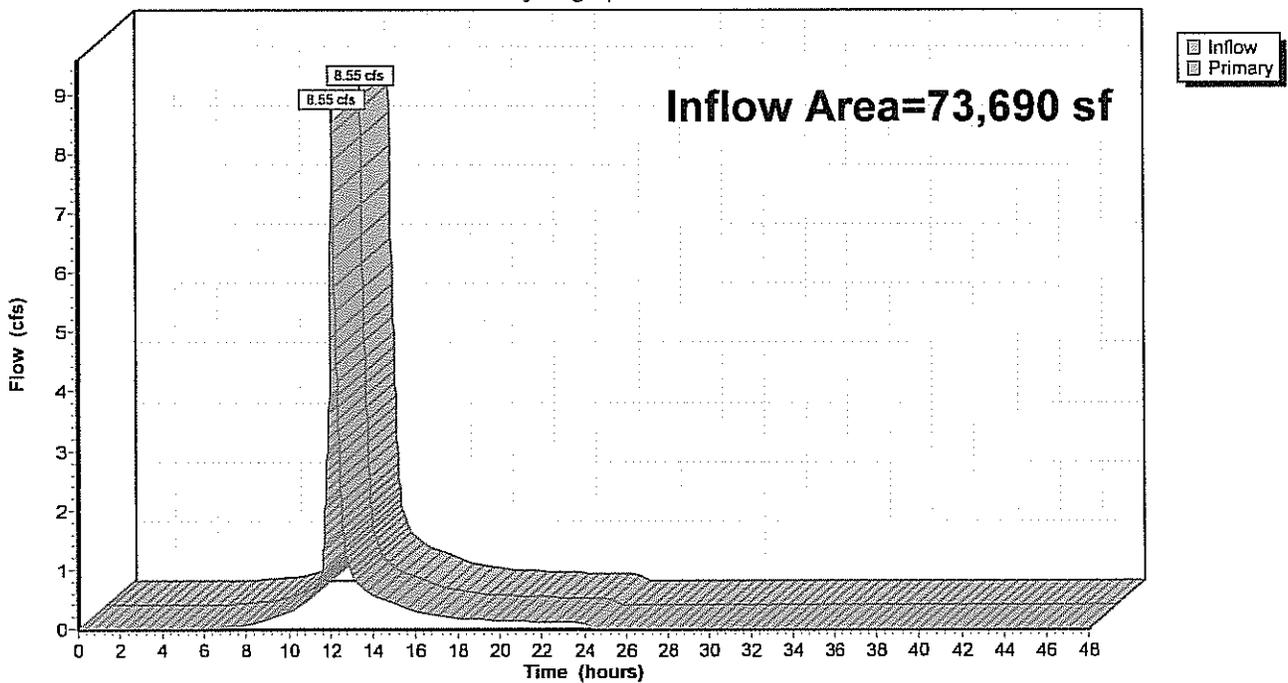
[40] Hint: Not Described (Outflow=Inflow)

Inflow Area = 73,690 sf, 38.79% Impervious, Inflow Depth = 5.03" for 100 YR event  
Inflow = 8.55 cfs @ 12.14 hrs, Volume= 30,875 cf  
Primary = 8.55 cfs @ 12.14 hrs, Volume= 30,875 cf, Atten= 0%, Lag= 0.0 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.02 hrs

### Pond AP-4: WET-2

Hydrograph



### Summary for Pond AP-5: WET-3

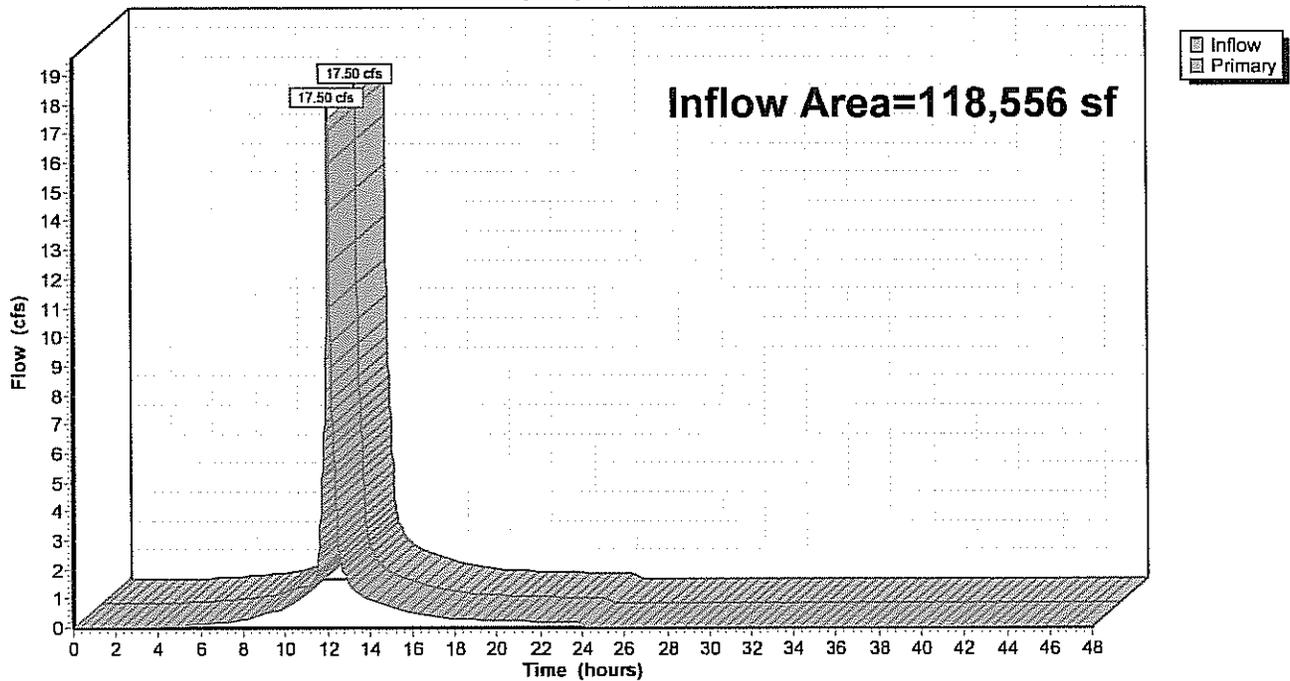
[40] Hint: Not Described (Outflow=Inflow)

Inflow Area = 118,556 sf, 67.97% Impervious, Inflow Depth = 5.82" for 100 YR event  
Inflow = 17.50 cfs @ 12.08 hrs, Volume= 57,531 cf  
Primary = 17.50 cfs @ 12.08 hrs, Volume= 57,531 cf, Atten= 0%, Lag= 0.0 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.02 hrs

### Pond AP-5: WET-3

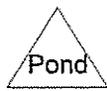
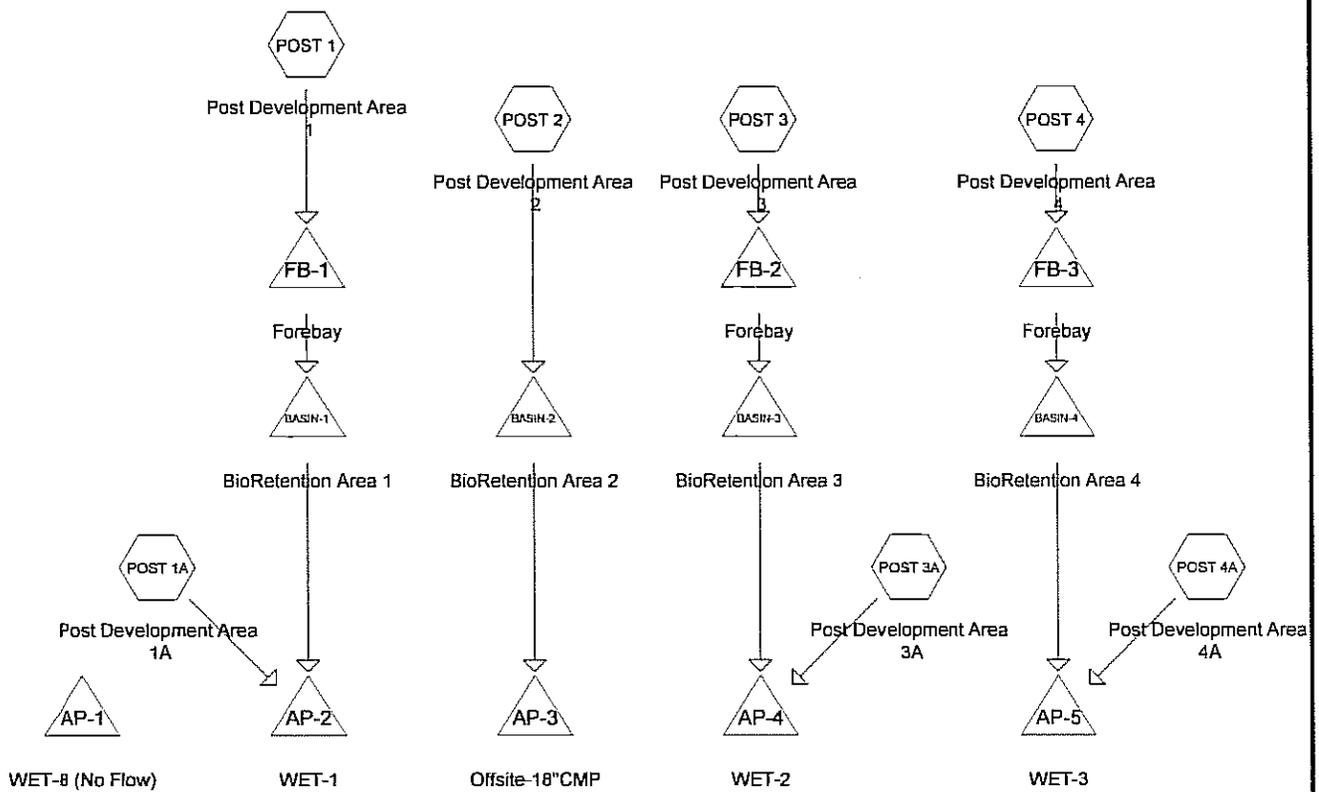
Hydrograph



## *Section 3*

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### *Post Development Hydrologic Analysis*



**Routing Diagram for 1998-POST-WS**  
 Prepared by Field Engineering Co. Inc., Printed 5/7/2014  
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**1998-POST-WS**

Type III 24-hr 2 YR Rainfall=3.50"

Prepared by Field Engineering Co. Inc.

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Time span=0.00-48.00 hrs, dt=0.02 hrs, 2401 points  
 Runoff by SCS TR-20 method, UH=SCS, Weighted-CN  
 Reach routing by Dyn-Stor-Ind method - Pond routing by Dyn-Stor-Ind method

<b>Subcatchment POST 1: Post Development</b>	Runoff Area=81,936 sf	4.31% Impervious	Runoff Depth=2.02"
	Tc=6.0 min	CN=85	Runoff=4.44 cfs 13,768 cf
<b>Subcatchment POST 1A: Post Development</b>	Runoff Area=47,737 sf	0.00% Impervious	Runoff Depth=1.01"
	Tc=6.0 min	CN=70	Runoff=1.19 cfs 4,010 cf
<b>Subcatchment POST 2: Post</b>	Runoff Area=157,728 sf	86.51% Impervious	Runoff Depth=2.94"
	Tc=6.0 min	CN=95	Runoff=11.71 cfs 38,631 cf
<b>Subcatchment POST 3: Post Development</b>	Runoff Area=29,735 sf	63.13% Impervious	Runoff Depth=2.36"
	Tc=6.0 min	CN=89	Runoff=1.86 cfs 5,841 cf
<b>Subcatchment POST 3A: Post</b>	Runoff Area=47,475 sf	35.05% Impervious	Runoff Depth=1.64"
	Tc=6.0 min	CN=80	Runoff=2.07 cfs 6,474 cf
<b>Subcatchment POST 4: Post Development</b>	Runoff Area=82,787 sf	85.50% Impervious	Runoff Depth=2.94"
	Tc=6.0 min	CN=95	Runoff=6.15 cfs 20,276 cf
<b>Subcatchment POST 4A: Post</b>	Runoff Area=35,765 sf	10.20% Impervious	Runoff Depth=1.18"
	Tc=6.0 min	CN=73	Runoff=1.08 cfs 3,516 cf
<b>Pond AP-1: WET-8 (No Flow)</b>			Primary=0.00 cfs 0 cf
<b>Pond AP-2: WET-1</b>			Inflow=1.19 cfs 4,623 cf Primary=1.19 cfs 4,623 cf
<b>Pond AP-3: Offsite-18"CMP</b>			Inflow=9.96 cfs 35,518 cf Primary=9.96 cfs 35,518 cf
<b>Pond AP-4: WET-2</b>			Inflow=2.07 cfs 9,778 cf Primary=2.07 cfs 9,778 cf
<b>Pond AP-5: WET-3</b>			Inflow=6.48 cfs 19,286 cf Primary=6.48 cfs 19,286 cf
<b>Pond BASIN-1: BioRetention Area 1</b>	Peak Elev=78.18'	Storage=9,794 cf	Inflow=3.60 cfs 10,265 cf Outflow=0.06 cfs 613 cf
<b>Pond BASIN-2: BioRetention Area 2</b>	Peak Elev=77.11'	Storage=6,266 cf	Inflow=11.71 cfs 38,631 cf Outflow=9.96 cfs 35,518 cf
<b>Pond BASIN-3: BioRetention Area 3</b>	Peak Elev=75.80'	Storage=2,557 cf	Inflow=1.83 cfs 4,902 cf Outflow=0.15 cfs 3,304 cf
<b>Pond BASIN-4: BioRetention Area 4</b>	Peak Elev=78.36'	Storage=4,582 cf	Inflow=6.10 cfs 19,003 cf Outflow=5.47 cfs 15,770 cf

**1998-POST-WS**

Type III 24-hr 2 YR Rainfall=3.50"

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**Pond FB-1: Forebay** Peak Elev=78.68' Storage=4,241 cf Inflow=4.44 cfs 13,768 cf  
Outflow=3.60 cfs 10,265 cf

**Pond FB-2: Forebay** Peak Elev=76.78' Storage=1,099 cf Inflow=1.86 cfs 5,841 cf  
Outflow=1.83 cfs 4,902 cf

**Pond FB-3: Forebay** Peak Elev=78.45' Storage=1,469 cf Inflow=6.15 cfs 20,276 cf  
Outflow=6.10 cfs 19,003 cf

**Total Runoff Area = 483,163 sf Runoff Volume = 92,516 cf Average Runoff Depth = 2.30"**  
**48.29% Pervious = 233,334 sf 51.71% Impervious = 249,829 sf**

**Summary for Subcatchment POST 1: Post Development Area 1**

Runoff = 4.44 cfs @ 12.09 hrs, Volume= 13,768 cf, Depth= 2.02"

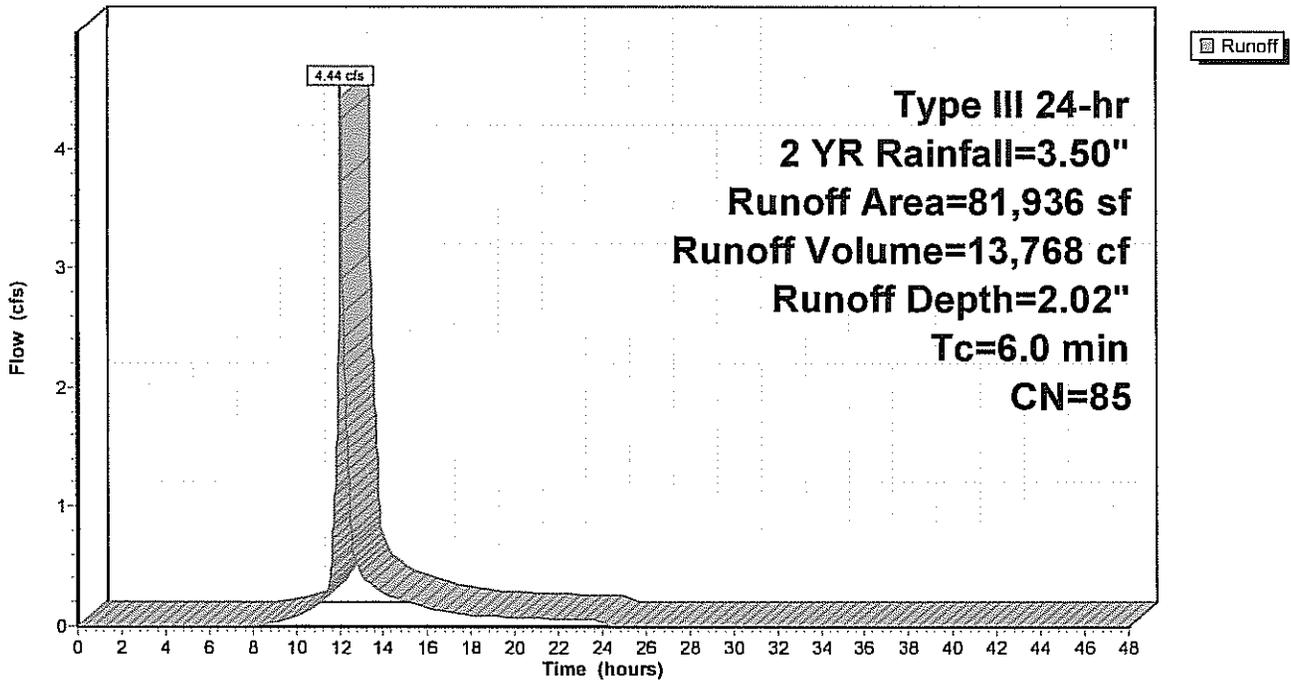
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.02 hrs  
 Type III 24-hr 2 YR Rainfall=3.50"

Area (sf)	CN	Description
51,749	89	Gravel roads, HSG C
3,528	98	Paved parking, HSG C
26,659	74	>75% Grass cover, Good, HSG C
81,936	85	Weighted Average
78,408		95.69% Pervious Area
3,528		4.31% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					Direct Entry,

**Subcatchment POST 1: Post Development Area 1**

Hydrograph



**Summary for Subcatchment POST 1A: Post Development Area 1A**

Runoff = 1.19 cfs @ 12.10 hrs, Volume= 4,010 cf, Depth= 1.01"

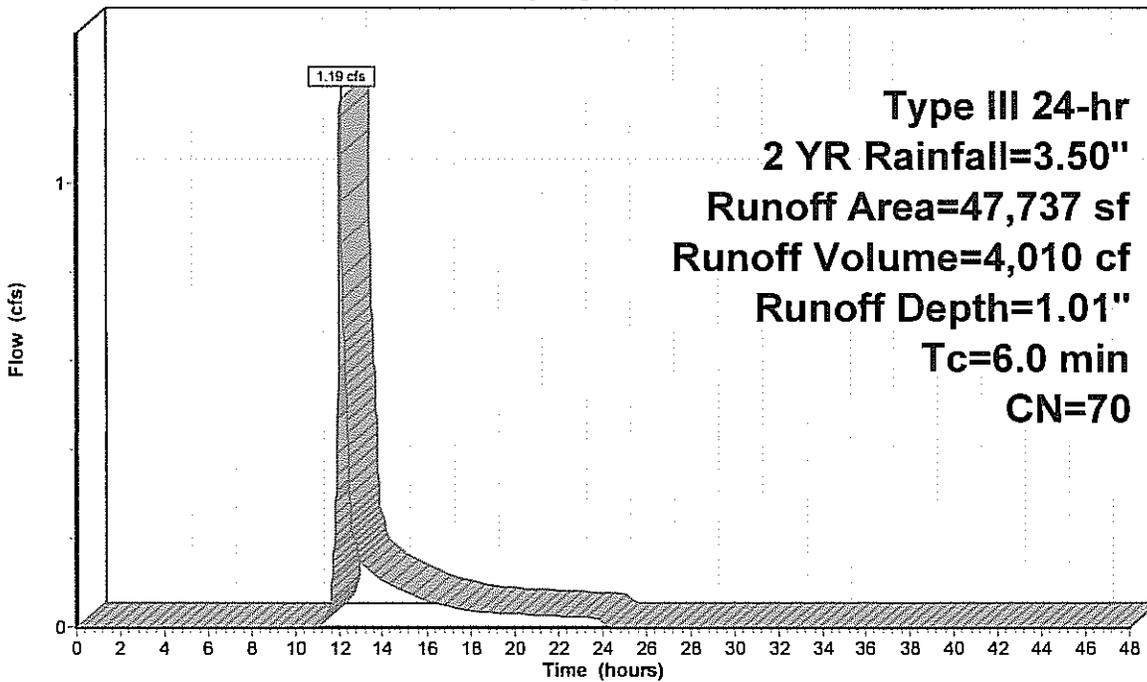
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.02 hrs  
 Type III 24-hr 2 YR Rainfall=3.50"

Area (sf)	CN	Description
942	89	Gravel roads, HSG C
46,795	70	Woods, Good, HSG C
47,737	70	Weighted Average
47,737		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					Direct Entry,

**Subcatchment POST 1A: Post Development Area 1A**

Hydrograph



**Summary for Subcatchment POST 2: Post Development Area 2**

Runoff = 11.71 cfs @ 12.08 hrs, Volume= 38,631 cf, Depth= 2.94"

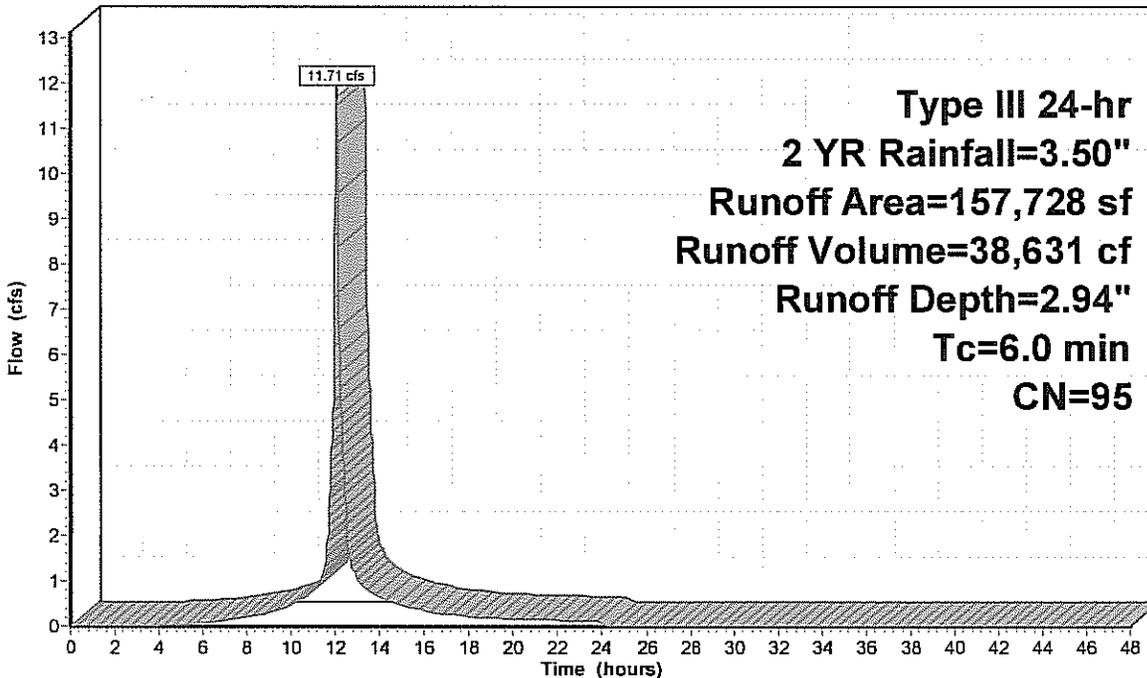
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.02 hrs  
 Type III 24-hr 2 YR Rainfall=3.50"

Area (sf)	CN	Description
3,154	89	Gravel roads, HSG C
59,037	98	Paved parking, HSG C
18,119	74	>75% Grass cover, Good, HSG C
77,418	98	Roofs, HSG C
157,728	95	Weighted Average
21,273		13.49% Pervious Area
136,455		86.51% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					Direct Entry,

**Subcatchment POST 2: Post Development Area 2**

Hydrograph



Runoff

**Type III 24-hr  
 2 YR Rainfall=3.50"  
 Runoff Area=157,728 sf  
 Runoff Volume=38,631 cf  
 Runoff Depth=2.94"  
 Tc=6.0 min  
 CN=95**

**Summary for Subcatchment POST 3: Post Development Area 3**

Runoff = 1.86 cfs @ 12.09 hrs, Volume= 5,841 cf, Depth= 2.36"

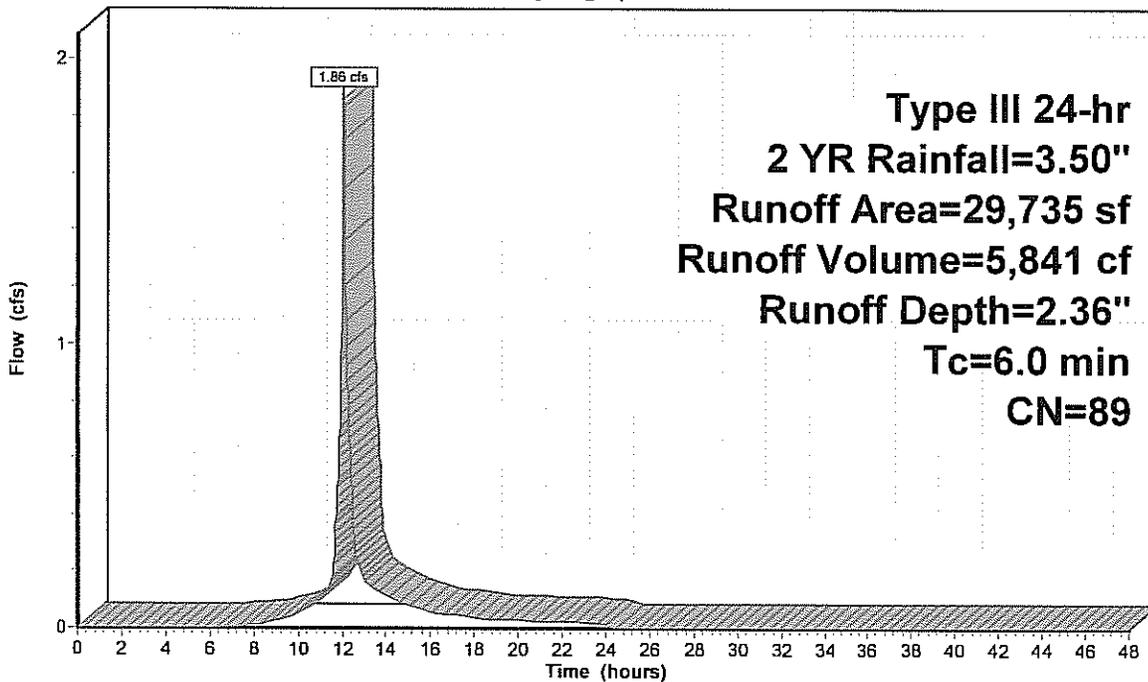
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.02 hrs  
 Type III 24-hr 2 YR Rainfall=3.50"

Area (sf)	CN	Description
18,773	98	Paved parking, HSG C
10,962	74	>75% Grass cover, Good, HSG C
29,735	89	Weighted Average
10,962		36.87% Pervious Area
18,773		63.13% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					Direct Entry,

**Subcatchment POST 3: Post Development Area 3**

Hydrograph



Runoff

Type III 24-hr  
 2 YR Rainfall=3.50"  
 Runoff Area=29,735 sf  
 Runoff Volume=5,841 cf  
 Runoff Depth=2.36"  
 Tc=6.0 min  
 CN=89

**Summary for Subcatchment POST 3A: Post Development Area 3A**

Runoff = 2.07 cfs @ 12.09 hrs, Volume= 6,474 cf, Depth= 1.64"

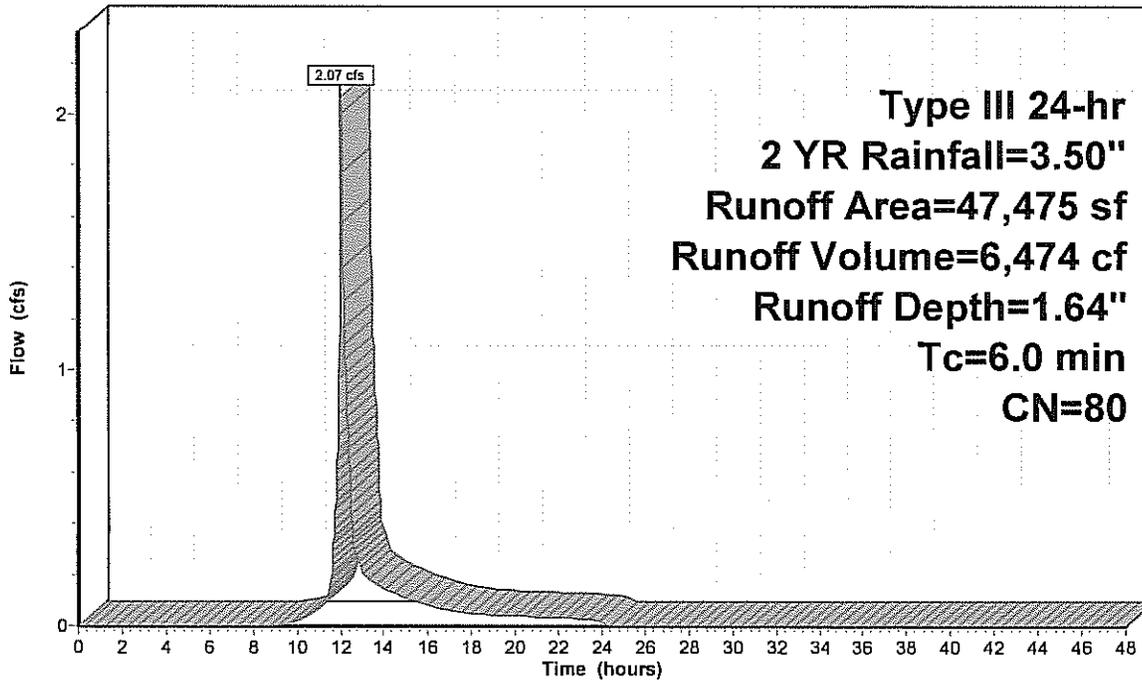
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.02 hrs  
 Type III 24-hr 2 YR Rainfall=3.50"

Area (sf)	CN	Description
14,950	98	Roofs, HSG C
1,689	98	Paved parking, HSG C
30,836	70	Woods, Good, HSG C
47,475	80	Weighted Average
30,836		64.95% Pervious Area
16,639		35.05% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					Direct Entry,

**Subcatchment POST 3A: Post Development Area 3A**

Hydrograph



Runoff

**Type III 24-hr  
 2 YR Rainfall=3.50"  
 Runoff Area=47,475 sf  
 Runoff Volume=6,474 cf  
 Runoff Depth=1.64"  
 Tc=6.0 min  
 CN=80**

**Summary for Subcatchment POST 4: Post Development Area 4**

Runoff = 6.15 cfs @ 12.08 hrs, Volume= 20,276 cf, Depth= 2.94"

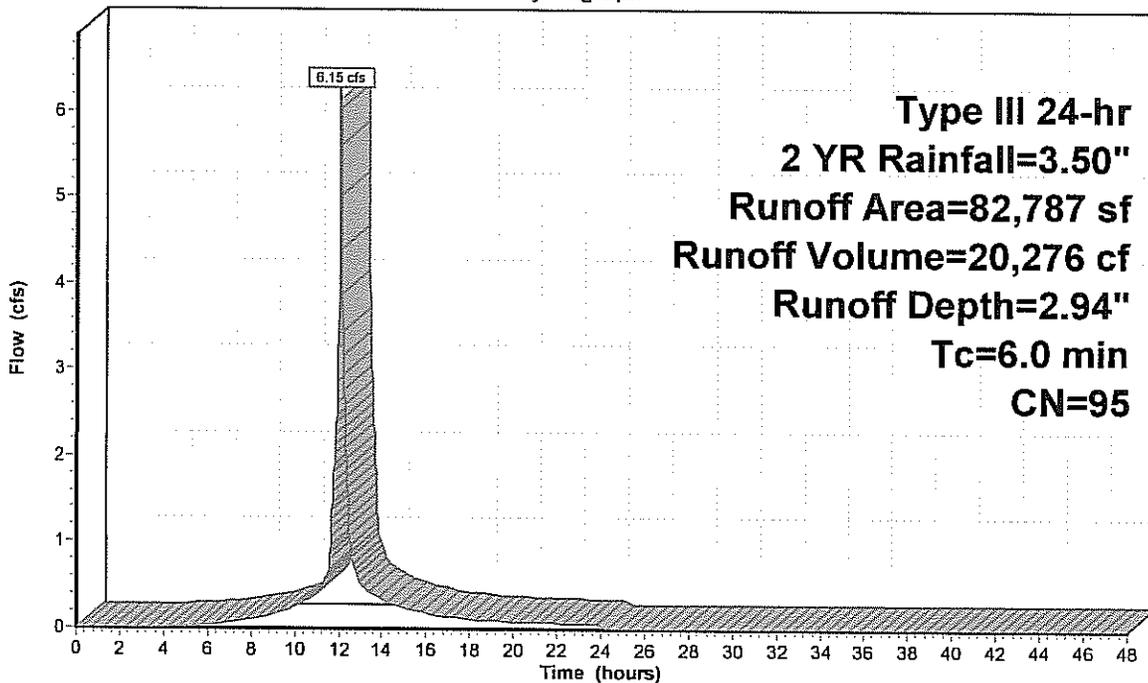
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.02 hrs  
 Type III 24-hr 2 YR Rainfall=3.50"

Area (sf)	CN	Description
70,785	98	Paved parking, HSG C
12,002	74	>75% Grass cover, Good, HSG C
82,787	95	Weighted Average
12,002		14.50% Pervious Area
70,785		85.50% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					Direct Entry,

**Subcatchment POST 4: Post Development Area 4**

Hydrograph



Runoff

**Summary for Subcatchment POST 4A: Post Development Area 4A**

Runoff = 1.08 cfs @ 12.10 hrs, Volume= 3,516 cf, Depth= 1.18"

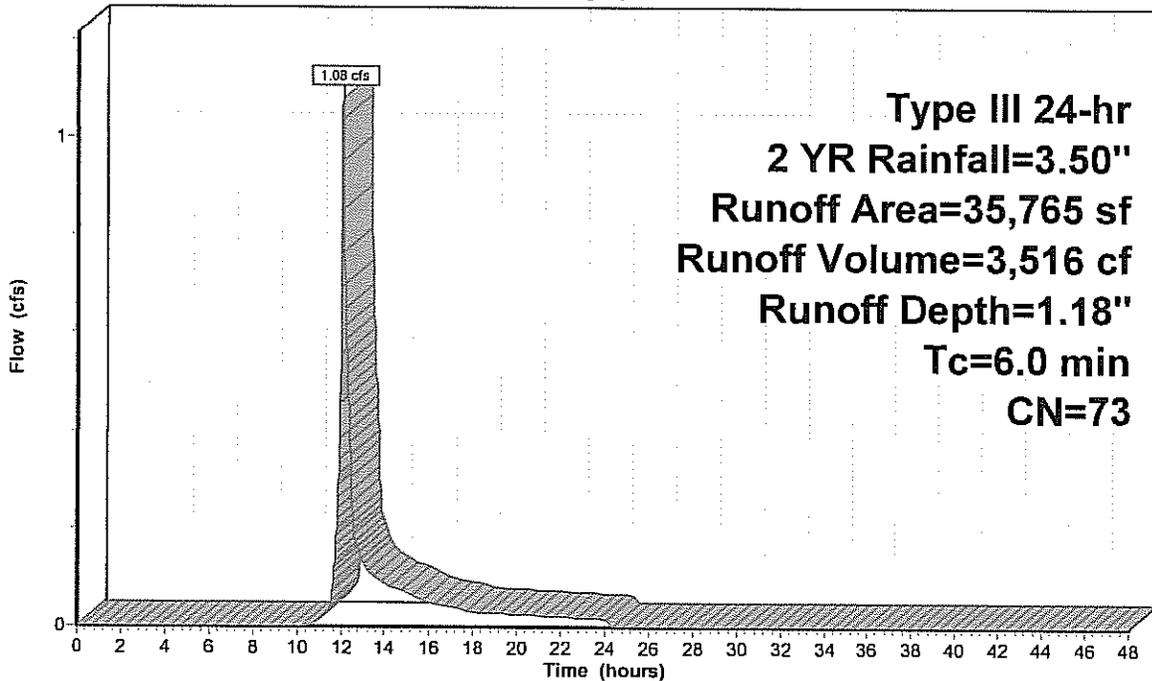
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.02 hrs  
 Type III 24-hr 2 YR Rainfall=3.50"

Area (sf)	CN	Description
32,116	70	Woods, Good, HSG C
3,649	98	Paved parking, HSG C
35,765	73	Weighted Average
32,116		89.80% Pervious Area
3,649		10.20% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					Direct Entry,

**Subcatchment POST 4A: Post Development Area 4A**

Hydrograph



Runoff

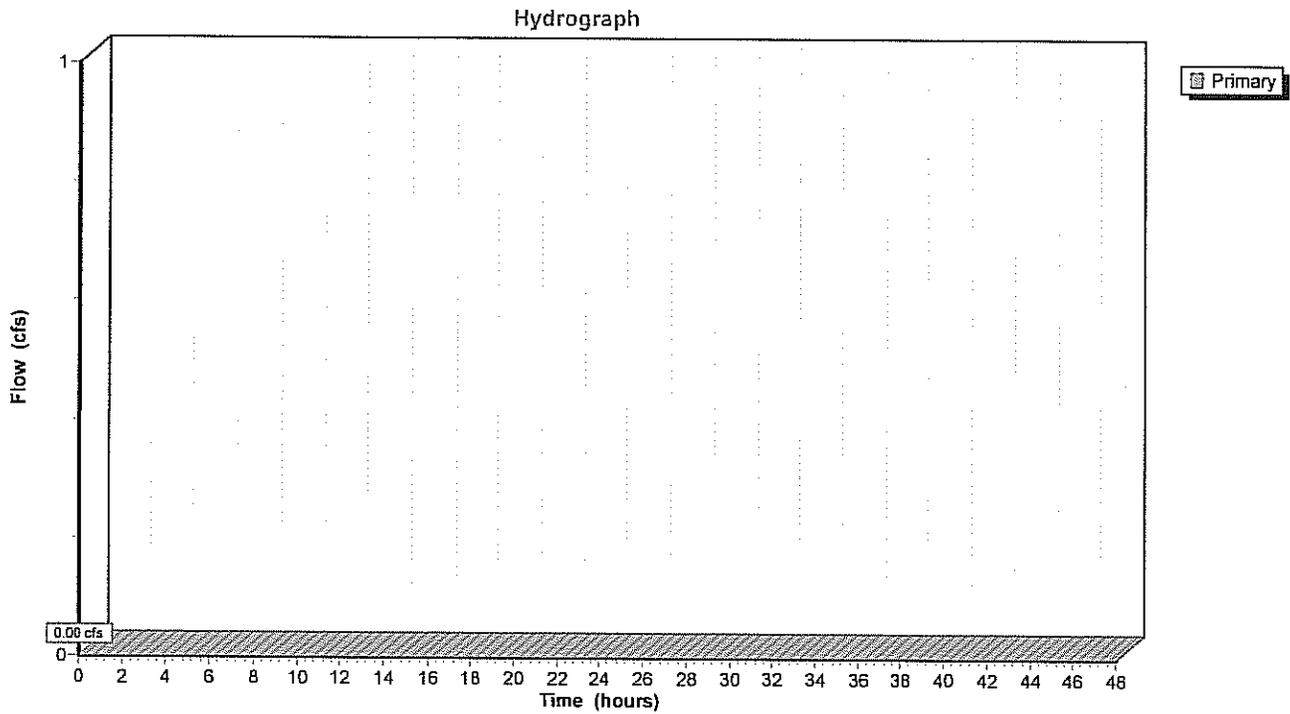
Type III 24-hr  
 2 YR Rainfall=3.50"  
 Runoff Area=35,765 sf  
 Runoff Volume=3,516 cf  
 Runoff Depth=1.18"  
 Tc=6.0 min  
 CN=73

### Summary for Pond AP-1: WET-8 (No Flow)

[40] Hint: Not Described (Outflow=Inflow)

Primary OutFlow Max=0.00 cfs @ 0.00 hrs HW=0.00' TW=0.00' (Dynamic Tailwater)

### Pond AP-1: WET-8 (No Flow)



### Summary for Pond AP-2: WET-1

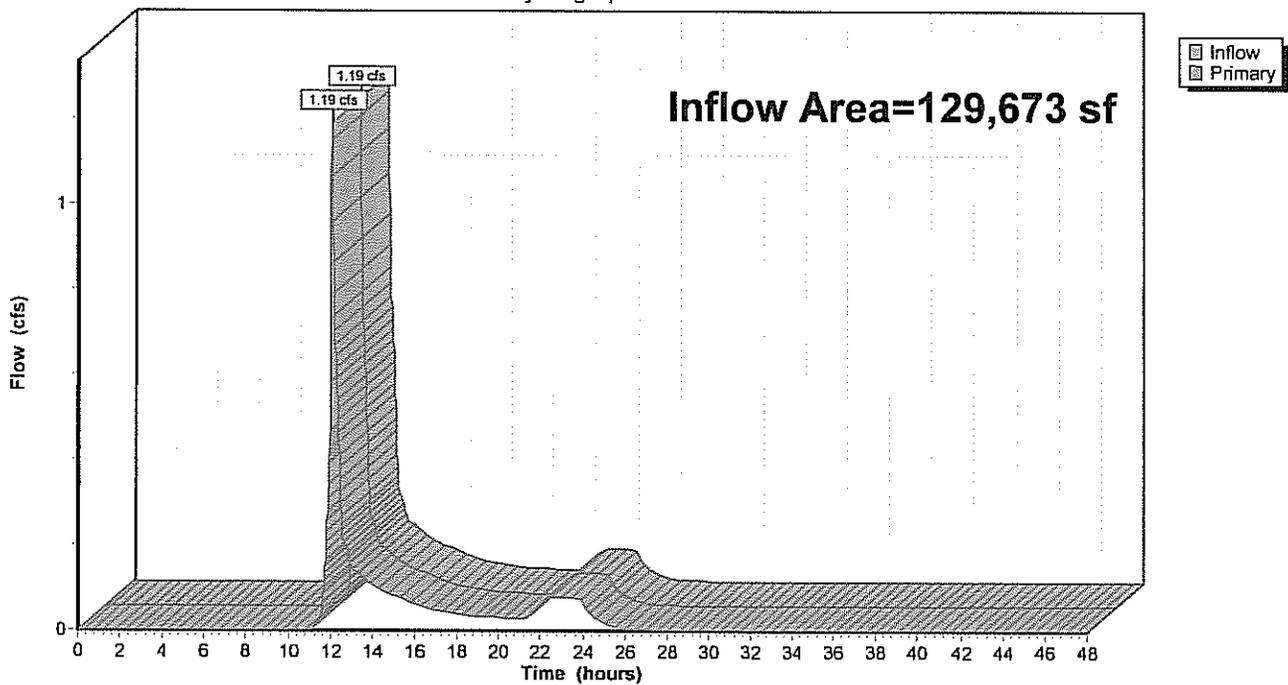
[40] Hint: Not Described (Outflow=Inflow)

Inflow Area = 129,673 sf, 2.72% Impervious, Inflow Depth = 0.43" for 2 YR event  
Inflow = 1.19 cfs @ 12.10 hrs, Volume= 4,623 cf  
Primary = 1.19 cfs @ 12.10 hrs, Volume= 4,623 cf, Atten= 0%, Lag= 0.0 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.02 hrs

### Pond AP-2: WET-1

Hydrograph



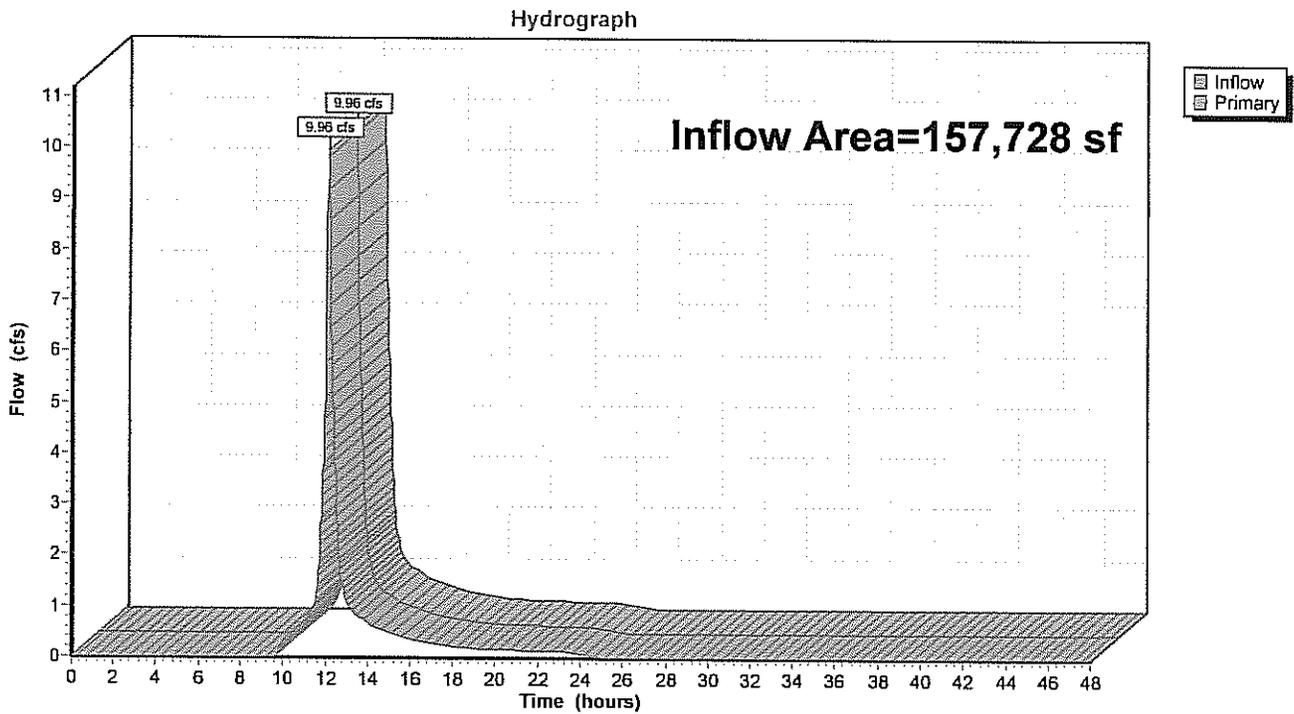
### Summary for Pond AP-3: Offsite-18"CMP

[40] Hint: Not Described (Outflow=Inflow)

Inflow Area = 157,728 sf, 86.51% Impervious, Inflow Depth = 2.70" for 2 YR event  
Inflow = 9.96 cfs @ 12.13 hrs, Volume= 35,518 cf  
Primary = 9.96 cfs @ 12.13 hrs, Volume= 35,518 cf, Atten= 0%, Lag= 0.0 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.02 hrs

### Pond AP-3: Offsite-18"CMP



### Summary for Pond AP-4: WET-2

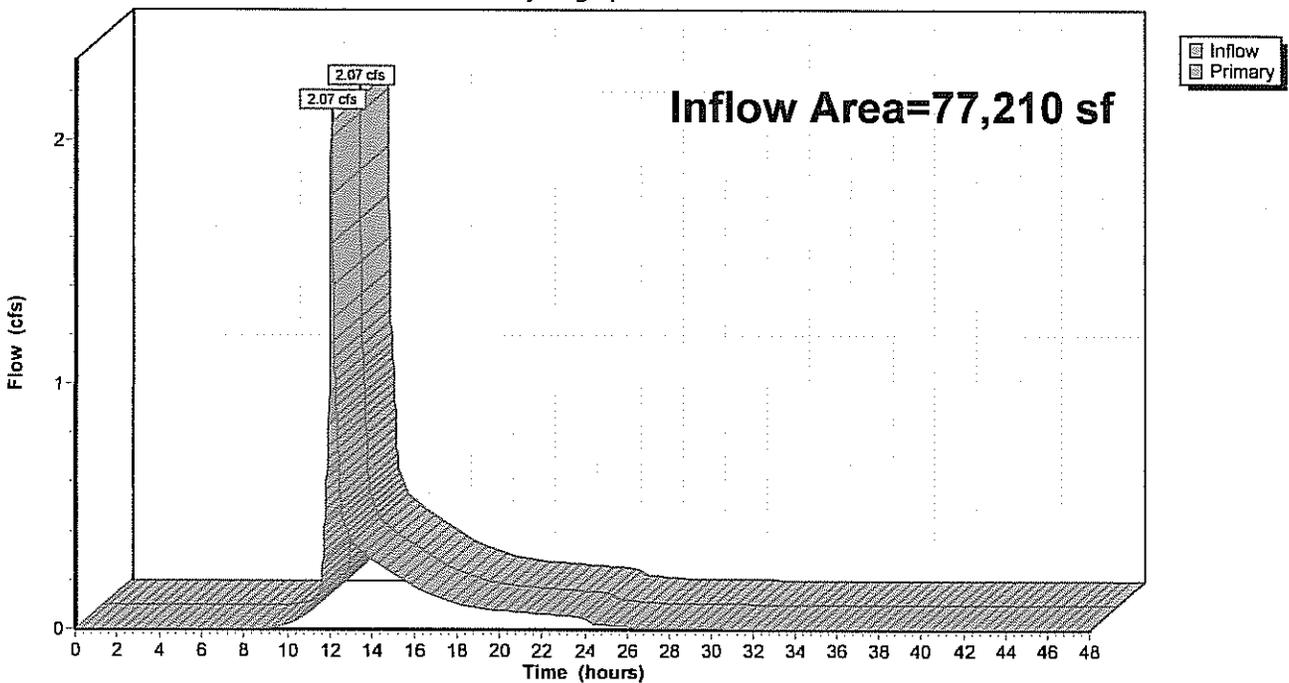
[40] Hint: Not Described (Outflow=Inflow)

Inflow Area = 77,210 sf, 45.86% Impervious, Inflow Depth > 1.52" for 2 YR event  
Inflow = 2.07 cfs @ 12.09 hrs, Volume= 9,778 cf  
Primary = 2.07 cfs @ 12.09 hrs, Volume= 9,778 cf, Atten= 0%, Lag= 0.0 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.02 hrs

### Pond AP-4: WET-2

Hydrograph



### Summary for Pond AP-5: WET-3

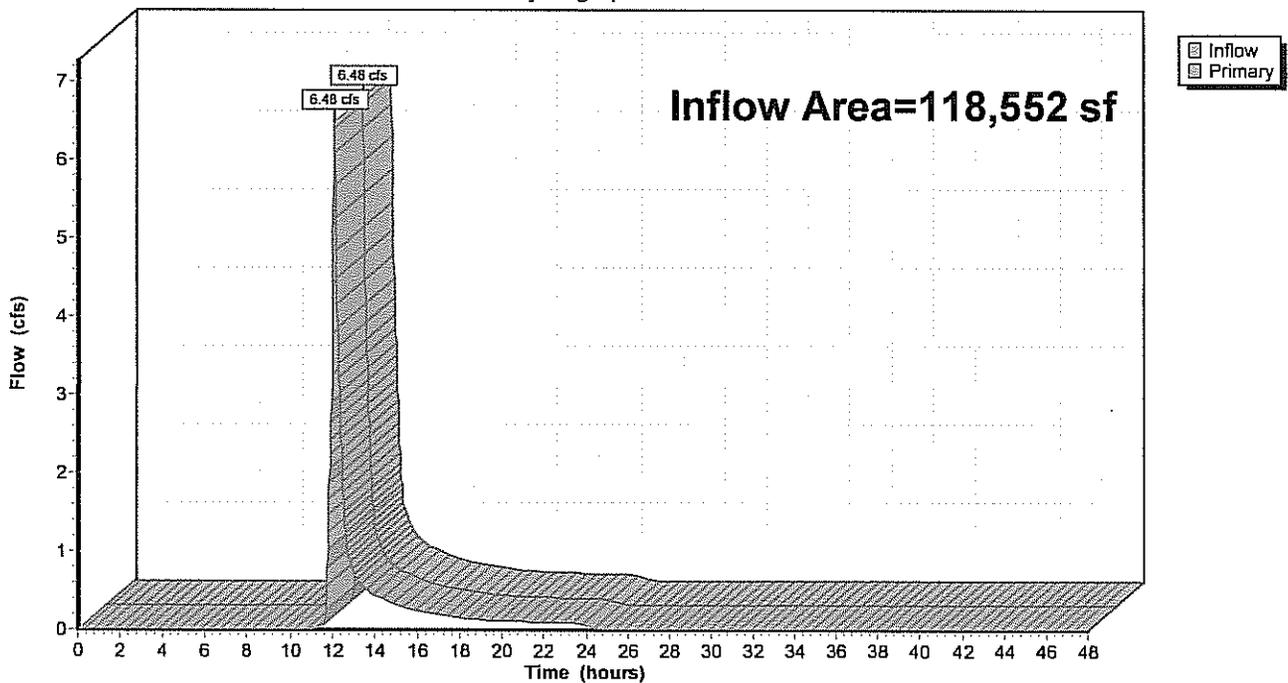
[40] Hint: Not Described (Outflow=Inflow)

Inflow Area = 118,552 sf, 62.79% Impervious, Inflow Depth = 1.95" for 2 YR event  
Inflow = 6.48 cfs @ 12.12 hrs, Volume= 19,286 cf  
Primary = 6.48 cfs @ 12.12 hrs, Volume= 19,286 cf, Atten= 0%, Lag= 0.0 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.02 hrs

### Pond AP-5: WET-3

Hydrograph



**Summary for Pond BASIN-1: BioRetention Area 1**

Inflow Area = 81,936 sf, 4.31% Impervious, Inflow Depth = 1.50" for 2 YR event  
 Inflow = 3.60 cfs @ 12.15 hrs, Volume= 10,265 cf  
 Outflow = 0.06 cfs @ 23.13 hrs, Volume= 613 cf, Atten= 98%, Lag= 658.6 min  
 Primary = 0.06 cfs @ 23.13 hrs, Volume= 613 cf

Routing by Dyn-Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.02 hrs  
 Peak Elev= 78.18' @ 23.13 hrs Surf.Area= 5,489 sf Storage= 9,794 cf  
 Flood Elev= 80.00' Surf.Area= 7,310 sf Storage= 21,444 cf

Plug-Flow detention time= 693.4 min calculated for 613 cf (6% of inflow)  
 Center-of-Mass det. time= 543.8 min ( 1,420.1 - 876.3 )

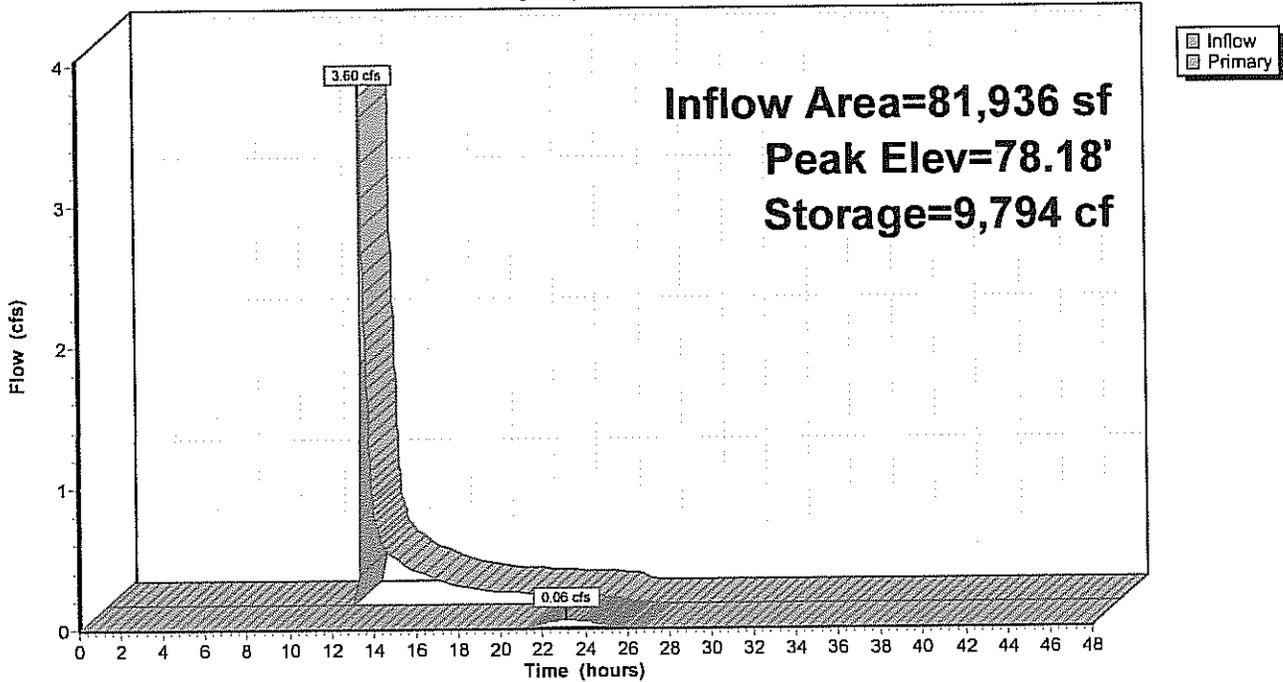
Volume	Invert	Avail.Storage	Storage Description
#1	76.00'	21,444 cf	Custom Stage Data (Prismatic) Listed below (Recalc)
Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
76.00	3,553	0	0
77.00	4,407	3,980	3,980
78.00	5,319	4,863	8,843
79.00	6,286	5,803	14,646
80.00	7,310	6,798	21,444

Device	Routing	Invert	Outlet Devices
#1	Primary	78.15'	5.0' long x 25.0' breadth Broad-Crested Rectangular Weir Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 Coef. (English) 2.68 2.70 2.70 2.64 2.63 2.64 2.64 2.63

Primary OutFlow Max=0.06 cfs @ 23.13 hrs HW=78.18' TW=0.00' (Dynamic Tailwater)  
 ↑-1=Broad-Crested Rectangular Weir (Weir Controls 0.06 cfs @ 0.43 fps)

### Pond BASIN-1: BioRetention Area 1

Hydrograph



**Summary for Pond BASIN-2: BioRetention Area 2**

Inflow Area = 157,728 sf, 86.51% Impervious, Inflow Depth = 2.94" for 2 YR event  
 Inflow = 11.71 cfs @ 12.08 hrs, Volume= 38,631 cf  
 Outflow = 9.96 cfs @ 12.13 hrs, Volume= 35,518 cf, Atten= 15%, Lag= 3.0 min  
 Primary = 9.96 cfs @ 12.13 hrs, Volume= 35,518 cf

Routing by Dyn-Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.02 hrs  
 Peak Elev= 77.11' @ 12.13 hrs Surf.Area= 3,741 sf Storage= 6,266 cf  
 Flood Elev= 78.00' Surf.Area= 4,425 sf Storage= 9,083 cf

Plug-Flow detention time= 78.0 min calculated for 35,503 cf (92% of inflow)  
 Center-of-Mass det. time= 36.6 min ( 814.9 - 778.3 )

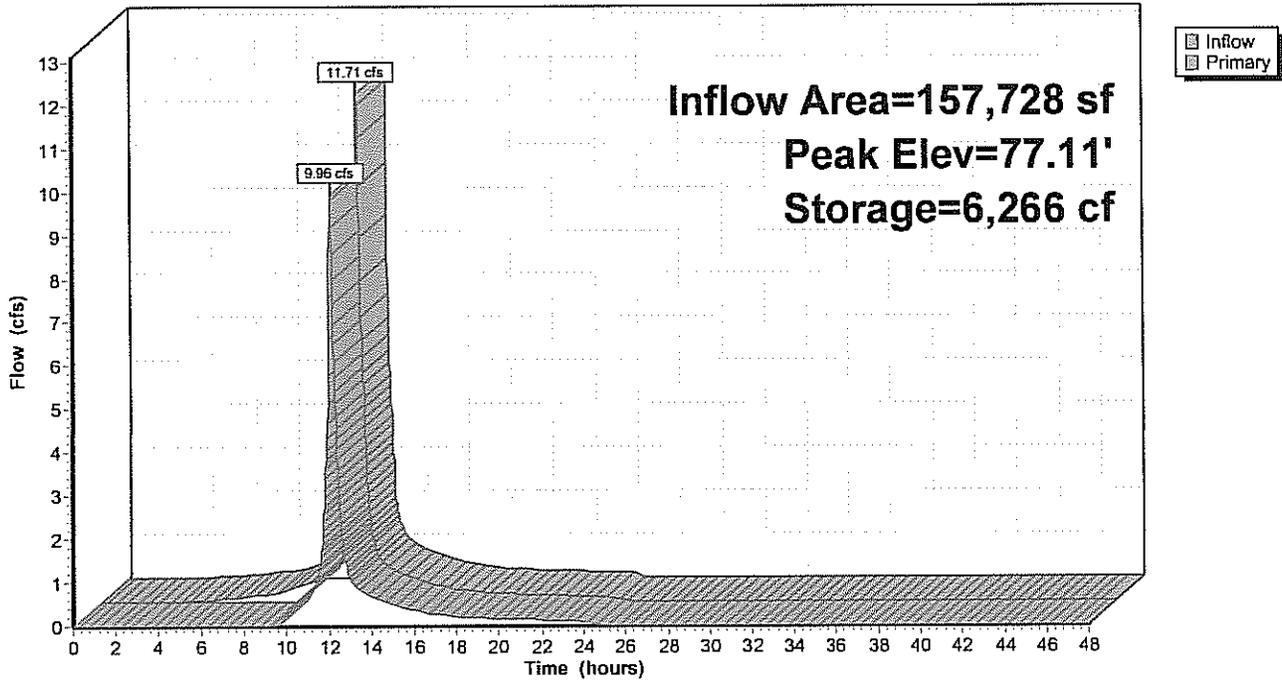
Volume	Invert	Avail.Storage	Storage Description
#1	74.50'	9,083 cf	<b>Custom Stage Data (Prismatic)</b> Listed below (Recalc)
Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
74.50	0	0	0
75.00	1,805	451	451
76.00	2,690	2,248	2,699
77.00	3,632	3,161	5,860
77.80	4,425	3,223	9,083

Device	Routing	Invert	Outlet Devices
#1	Primary	76.15'	<b>4.0' long x 2.0' breadth Broad-Crested Rectangular Weir</b> Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 3.00 3.50 Coef. (English) 2.54 2.61 2.61 2.60 2.66 2.70 2.77 2.89 2.88 2.85 3.07 3.20 3.32

Primary OutFlow Max=9.93 cfs @ 12.13 hrs HW=77.11' TW=0.00' (Dynamic Tailwater)  
 ↑1=Broad-Crested Rectangular Weir (Weir Controls 9.93 cfs @ 2.59 fps)

### Pond BASIN-2: BioRetention Area 2

Hydrograph



**Summary for Pond BASIN-3: BioRetention Area 3**

Inflow Area = 29,735 sf, 63.13% Impervious, Inflow Depth = 1.98" for 2 YR event  
 Inflow = 1.83 cfs @ 12.10 hrs, Volume= 4,902 cf  
 Outflow = 0.15 cfs @ 13.21 hrs, Volume= 3,304 cf, Atten= 92%, Lag= 66.5 min  
 Primary = 0.15 cfs @ 13.21 hrs, Volume= 3,304 cf

Routing by Dyn-Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.02 hrs  
 Peak Elev= 75.80' @ 13.21 hrs Surf.Area= 3,484 sf Storage= 2,557 cf  
 Flood Elev= 78.00' Surf.Area= 5,167 sf Storage= 12,044 cf

Plug-Flow detention time= 302.5 min calculated for 3,303 cf (67% of inflow)  
 Center-of-Mass det. time= 203.2 min ( 1,046.9 - 843.7 )

Volume	Invert	Avail.Storage	Storage Description
#1	75.00'	12,044 cf	Custom Stage Data (Prismatic) Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
75.00	2,938	0	0
76.00	3,624	3,281	3,281
77.00	4,367	3,996	7,277
78.00	5,167	4,767	12,044

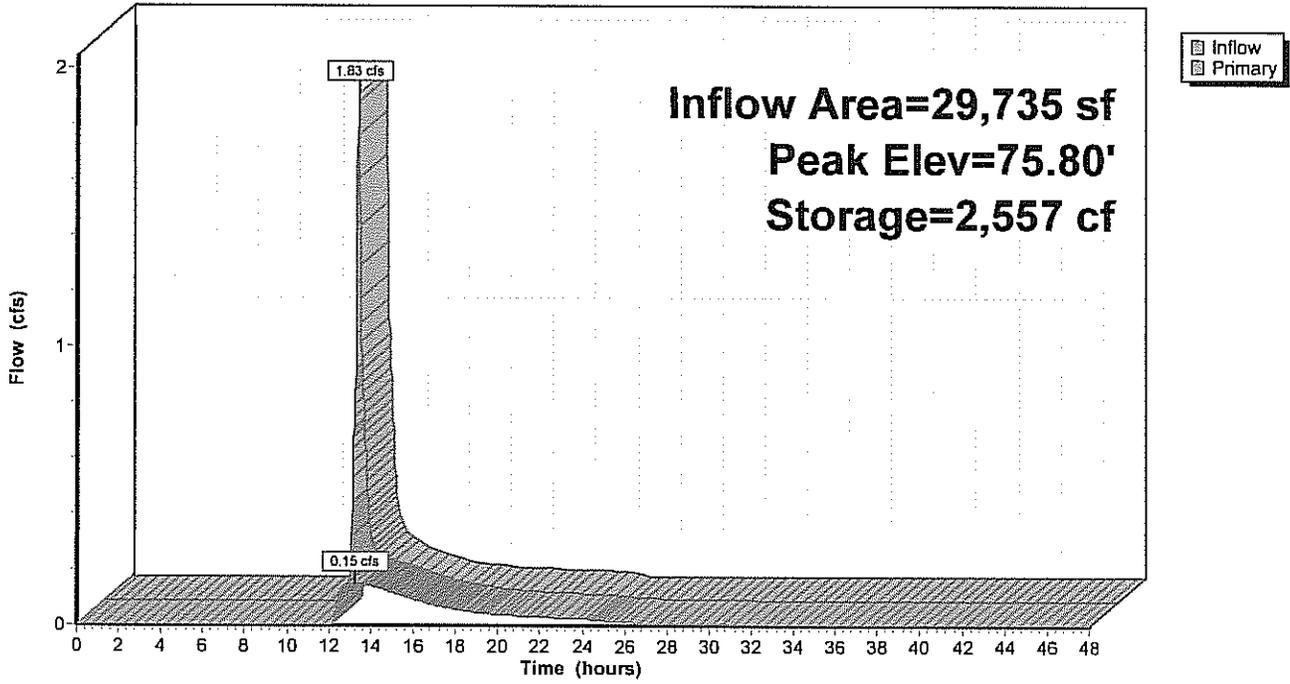
Device	Routing	Invert	Outlet Devices
#1	Primary	75.00'	<b>12.0" Round 12" HDPE</b> L= 30.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 75.00' / 74.80' S= 0.0067 '/' Cc= 0.900 n= 0.011 Concrete pipe, straight & clean, Flow Area= 0.79 sf
#2	Device 1	75.50'	<b>4.0" Vert. 4" Orifice</b> C= 0.600
#3	Device 1	76.50'	<b>4.0' long x 1.50' rise Sharp-Crested Rectangular Weir</b> 2 End Contraction(s) 1.5' Crest Height

**Primary OutFlow** Max=0.15 cfs @ 13.21 hrs HW=75.80' TW=0.00' (Dynamic Tailwater)

- 1=12" HDPE (Passes 0.15 cfs of 1.72 cfs potential flow)
- 2=4" Orifice (Orifice Controls 0.15 cfs @ 1.85 fps)
- 3=Sharp-Crested Rectangular Weir ( Controls 0.00 cfs)

### Pond BASIN-3: BioRetention Area 3

Hydrograph



**Summary for Pond BASIN-4: BioRetention Area 4**

Inflow Area = 82,787 sf, 85.50% Impervious, Inflow Depth = 2.75" for 2 YR event  
 Inflow = 6.10 cfs @ 12.09 hrs, Volume= 19,003 cf  
 Outflow = 5.47 cfs @ 12.13 hrs, Volume= 15,770 cf, Atten= 10%, Lag= 2.6 min  
 Primary = 5.47 cfs @ 12.13 hrs, Volume= 15,770 cf

Routing by Dyn-Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.02 hrs  
 Peak Elev= 78.36' @ 12.13 hrs Surf.Area= 3,876 sf Storage= 4,582 cf  
 Flood Elev= 79.00' Surf.Area= 4,374 sf Storage= 7,218 cf

Plug-Flow detention time= 107.0 min calculated for 15,763 cf (83% of inflow)  
 Center-of-Mass det. time= 40.1 min ( 841.5 - 801.4 )

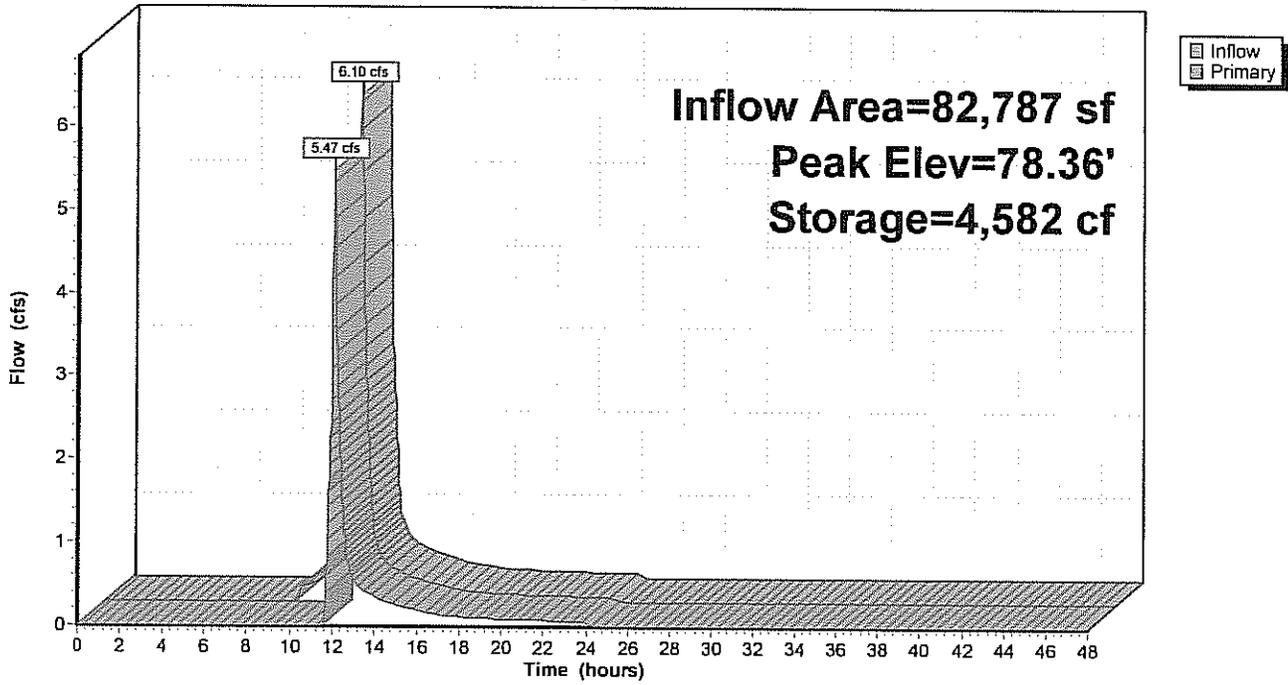
Volume	Invert	Avail.Storage	Storage Description
#1	77.00'	7,218 cf	Custom Stage Data (Prismatic) Listed below (Recalc)
Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
77.00	2,871	0	0
78.00	3,595	3,233	3,233
79.00	4,374	3,985	7,218

Device	Routing	Invert	Outlet Devices
#1	Primary	78.00'	<b>10.0' long x 8.0' breadth Broad-Crested Rectangular Weir</b> Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 3.00 3.50 4.00 4.50 5.00 5.50 Coef. (English) 2.43 2.54 2.70 2.69 2.68 2.68 2.66 2.64 2.64 2.64 2.65 2.65 2.66 2.66 2.68 2.70 2.74

Primary OutFlow Max=5.44 cfs @ 12.13 hrs HW=78.36' TW=0.00' (Dynamic Tailwater)  
 ↑1=Broad-Crested Rectangular Weir (Weir Controls 5.44 cfs @ 1.51 fps)

**Pond BASIN-4: BioRetention Area 4**

Hydrograph



**Summary for Pond FB-1: Forebay**

Inflow Area = 81,936 sf, 4.31% Impervious, Inflow Depth = 2.02" for 2 YR event  
 Inflow = 4.44 cfs @ 12.09 hrs, Volume= 13,768 cf  
 Outflow = 3.60 cfs @ 12.15 hrs, Volume= 10,265 cf, Atten= 19%, Lag= 3.6 min  
 Primary = 3.60 cfs @ 12.15 hrs, Volume= 10,265 cf

Routing by Dyn-Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.02 hrs  
 Peak Elev= 78.68' @ 12.15 hrs Surf.Area= 2,742 sf Storage= 4,241 cf  
 Flood Elev= 79.00' Surf.Area= 2,991 sf Storage= 5,158 cf

Plug-Flow detention time= 142.2 min calculated for 10,261 cf (75% of inflow)  
 Center-of-Mass det. time= 54.1 min ( 876.3 - 822.2 )

Volume	Invert	Avail.Storage	Storage Description
#1	76.50'	5,158 cf	Custom Stage Data (Prismatic) Listed below (Recalc)

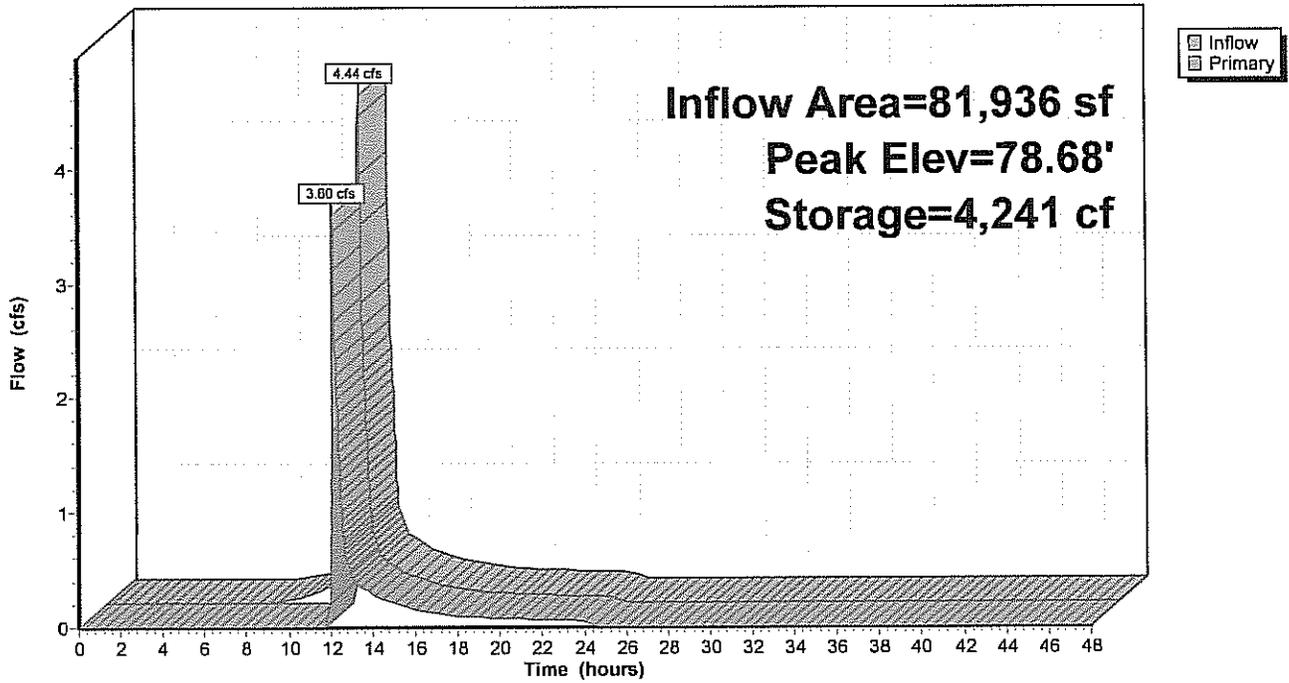
Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
76.50	1,200	0	0
77.00	1,518	680	680
78.00	2,227	1,873	2,552
78.50	2,602	1,207	3,759
79.00	2,991	1,398	5,158

Device	Routing	Invert	Outlet Devices
#1	Primary	78.40'	<b>10.0' long x 6.0' breadth Broad-Crested Rectangular Weir</b> Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 3.00 3.50 4.00 4.50 5.00 5.50 Coef. (English) 2.37 2.51 2.70 2.68 2.68 2.67 2.65 2.65 2.65 2.65 2.66 2.66 2.67 2.69 2.72 2.76 2.83

Primary OutFlow Max=3.57 cfs @ 12.15 hrs HW=78.68' TW=76.23' (Dynamic Tailwater)  
 ↳1=Broad-Crested Rectangular Weir (Weir Controls 3.57 cfs @ 1.28 fps)

### Pond FB-1: Forebay

Hydrograph



**Summary for Pond FB-2: Forebay**

Inflow Area = 29,735 sf, 63.13% Impervious, Inflow Depth = 2.36" for 2 YR event  
 Inflow = 1.86 cfs @ 12.09 hrs, Volume= 5,841 cf  
 Outflow = 1.83 cfs @ 12.10 hrs, Volume= 4,902 cf, Atten= 2%, Lag= 1.1 min  
 Primary = 1.83 cfs @ 12.10 hrs, Volume= 4,902 cf

Routing by Dyn-Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.02 hrs  
 Peak Elev= 76.78' @ 12.10 hrs Surf.Area= 907 sf Storage= 1,099 cf  
 Flood Elev= 77.00' Surf.Area= 982 sf Storage= 1,304 cf

Plug-Flow detention time= 103.2 min calculated for 4,902 cf (84% of inflow)  
 Center-of-Mass det. time= 36.2 min ( 843.7 - 807.6 )

Volume	Invert	Avail.Storage	Storage Description
#1	75.00'	1,304 cf	Custom Stage Data (Prismatic) Listed below (Recalc)

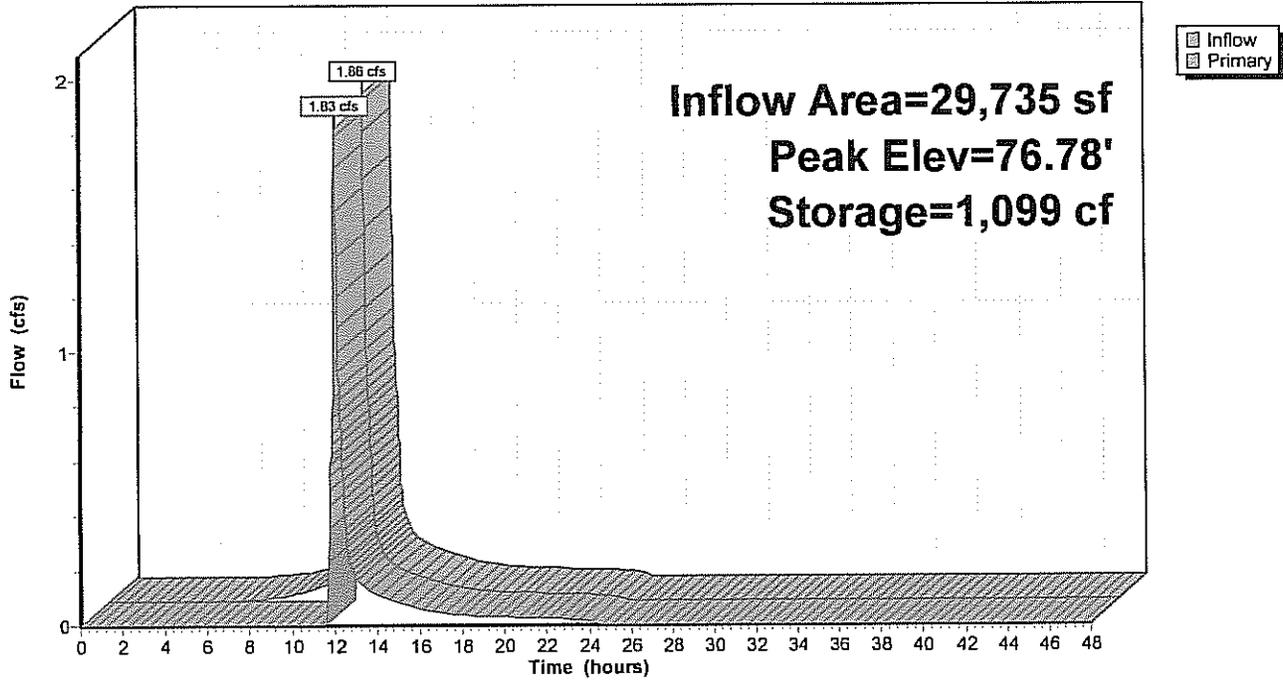
Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
75.00	350	0	0
76.00	638	494	494
77.00	982	810	1,304

Device	Routing	Invert	Outlet Devices
#1	Primary	76.60'	<b>10.0' long x 5.0' breadth Broad-Crested Rectangular Weir</b> Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 3.00 3.50 4.00 4.50 5.00 5.50 Coef. (English) 2.34 2.50 2.70 2.68 2.68 2.66 2.65 2.65 2.65 2.65 2.67 2.66 2.68 2.70 2.74 2.79 2.88

Primary OutFlow Max=1.82 cfs @ 12.10 hrs HW=76.78' TW=75.34' (Dynamic Tailwater)  
 ↑1=Broad-Crested Rectangular Weir (Weir Controls 1.82 cfs @ 1.00 fps)

### Pond FB-2: Forebay

Hydrograph



**Summary for Pond FB-3: Forebay**

Inflow Area = 82,787 sf, 85.50% Impervious, Inflow Depth = 2.94" for 2 YR event  
 Inflow = 6.15 cfs @ 12.08 hrs, Volume= 20,276 cf  
 Outflow = 6.10 cfs @ 12.09 hrs, Volume= 19,003 cf, Atten= 1%, Lag= 0.2 min  
 Primary = 6.10 cfs @ 12.09 hrs, Volume= 19,003 cf

Routing by Dyn-Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.02 hrs  
 Peak Elev= 78.45' @ 12.10 hrs Surf.Area= 1,294 sf Storage= 1,469 cf  
 Flood Elev= 78.80' Surf.Area= 1,439 sf Storage= 1,941 cf

Plug-Flow detention time= 57.3 min calculated for 18,995 cf (94% of inflow)  
 Center-of-Mass det. time= 23.2 min ( 801.4 - 778.3 )

Volume	Invert	Avail.Storage	Storage Description
#1	77.00'	1,941 cf	Custom Stage Data (Prismatic) Listed below (Recalc)

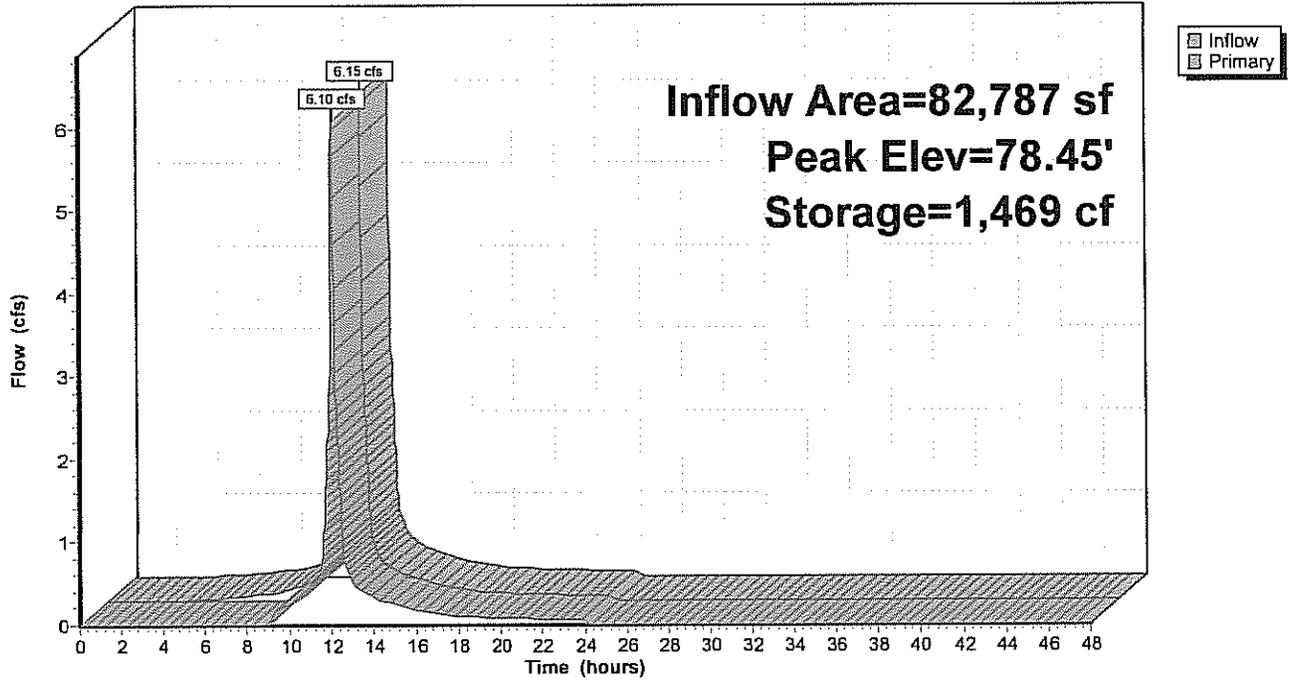
Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
77.00	743	0	0
78.00	1,104	924	924
78.80	1,439	1,017	1,941

Device	Routing	Invert	Outlet Devices
#1	Primary	78.30'	<b>38.0' long x 1.0' breadth Broad-Crested Rectangular Weir</b> Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 3.00 Coef. (English) 2.69 2.72 2.75 2.85 2.98 3.08 3.20 3.28 3.31 3.30 3.31 3.32

Primary OutFlow Max=5.84 cfs @ 12.09 hrs HW=78.45' TW=78.34' (Dynamic Tailwater)  
 ↑1=Broad-Crested Rectangular Weir (Weir Controls 5.84 cfs @ 1.00 fps)

### Pond FB-3: Forebay

Hydrograph



**1998-POST-WS**

Type III 24-hr 10 YR Rainfall=4.80"

Prepared by Field Engineering Co. Inc.

Printed 5/7/2014

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Time span=0.00-48.00 hrs, dt=0.02 hrs, 2401 points  
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN  
Reach routing by Dyn-Stor-Ind method - Pond routing by Dyn-Stor-Ind method

**Subcatchment POST 1: Post Development** Runoff Area=81,936 sf 4.31% Impervious Runoff Depth=3.18"  
Tc=6.0 min CN=85 Runoff=6.95 cfs 21,738 cf

**Subcatchment POST 1A: Post Development** Runoff Area=47,737 sf 0.00% Impervious Runoff Depth=1.89"  
Tc=6.0 min CN=70 Runoff=2.37 cfs 7,516 cf

**Subcatchment POST 2: Post** Runoff Area=157,728 sf 86.51% Impervious Runoff Depth=4.22"  
Tc=6.0 min CN=95 Runoff=16.47 cfs 55,487 cf

**Subcatchment POST 3: Post Development** Runoff Area=29,735 sf 63.13% Impervious Runoff Depth=3.58"  
Tc=6.0 min CN=89 Runoff=2.79 cfs 8,873 cf

**Subcatchment POST 3A: Post** Runoff Area=47,475 sf 35.05% Impervious Runoff Depth=2.72"  
Tc=6.0 min CN=80 Runoff=3.47 cfs 10,758 cf

**Subcatchment POST 4: Post Development** Runoff Area=82,787 sf 85.50% Impervious Runoff Depth=4.22"  
Tc=6.0 min CN=95 Runoff=8.65 cfs 29,124 cf

**Subcatchment POST 4A: Post** Runoff Area=35,765 sf 10.20% Impervious Runoff Depth=2.12"  
Tc=6.0 min CN=73 Runoff=2.02 cfs 6,333 cf

**Pond AP-1: WET-8 (No Flow)** Primary=0.00 cfs 0 cf

**Pond AP-2: WET-1** Inflow=2.37 cfs 16,099 cf  
Primary=2.37 cfs 16,099 cf

**Pond AP-3: Offsite-18" CMP** Inflow=14.26 cfs 52,374 cf  
Primary=14.26 cfs 52,374 cf

**Pond AP-4: WET-2** Inflow=3.55 cfs 17,093 cf  
Primary=3.55 cfs 17,093 cf

**Pond AP-5: WET-3** Inflow=9.66 cfs 30,950 cf  
Primary=9.66 cfs 30,950 cf

**Pond BASIN-1: BioRetention Area 1** Peak Elev=78.27' Storage=10,310 cf Inflow=6.54 cfs 18,235 cf  
Outflow=0.55 cfs 8,583 cf

**Pond BASIN-2: BioRetention Area 2** Peak Elev=77.35' Storage=7,205 cf Inflow=16.47 cfs 55,487 cf  
Outflow=14.26 cfs 52,374 cf

**Pond BASIN-3: BioRetention Area 3** Peak Elev=76.22' Storage=4,097 cf Inflow=2.74 cfs 7,934 cf  
Outflow=0.31 cfs 6,335 cf

**Pond BASIN-4: BioRetention Area 4** Peak Elev=78.45' Storage=4,926 cf Inflow=8.44 cfs 27,850 cf  
Outflow=7.76 cfs 24,617 cf

**1998-POST-WS**

Type III 24-hr 10 YR Rainfall=4.80"

Prepared by Field Engineering Co. Inc.

Printed 5/7/2014

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**Pond FB-1: Forebay** Peak Elev=78.81' Storage=4,595 cf Inflow=6.95 cfs 21,738 cf  
Outflow=6.54 cfs 18,235 cf

**Pond FB-2: Forebay** Peak Elev=76.84' Storage=1,149 cf Inflow=2.79 cfs 8,873 cf  
Outflow=2.74 cfs 7,934 cf

**Pond FB-3: Forebay** Peak Elev=78.52' Storage=1,552 cf Inflow=8.65 cfs 29,124 cf  
Outflow=8.44 cfs 27,850 cf

**Total Runoff Area = 483,163 sf Runoff Volume = 139,828 cf Average Runoff Depth = 3.47"**  
**48.29% Pervious = 233,334 sf 51.71% Impervious = 249,829 sf**

**Summary for Subcatchment POST 1: Post Development Area 1**

Runoff = 6.95 cfs @ 12.09 hrs, Volume= 21,738 cf, Depth= 3.18"

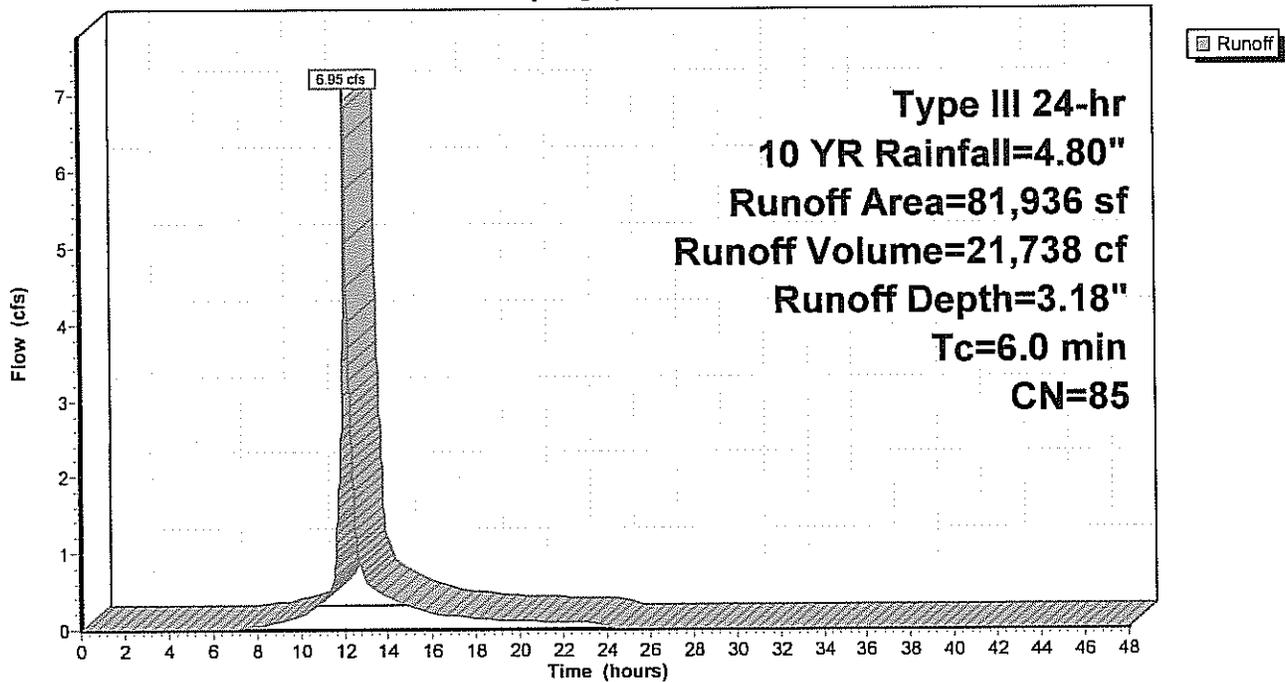
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.02 hrs  
 Type III 24-hr 10 YR Rainfall=4.80"

Area (sf)	CN	Description
51,749	89	Gravel roads, HSG C
3,528	98	Paved parking, HSG C
26,659	74	>75% Grass cover, Good, HSG C
81,936	85	Weighted Average
78,408		95.69% Pervious Area
3,528		4.31% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					Direct Entry,

**Subcatchment POST 1: Post Development Area 1**

Hydrograph



**Summary for Subcatchment POST 1A: Post Development Area 1A**

Runoff = 2.37 cfs @ 12.09 hrs, Volume= 7,516 cf, Depth= 1.89"

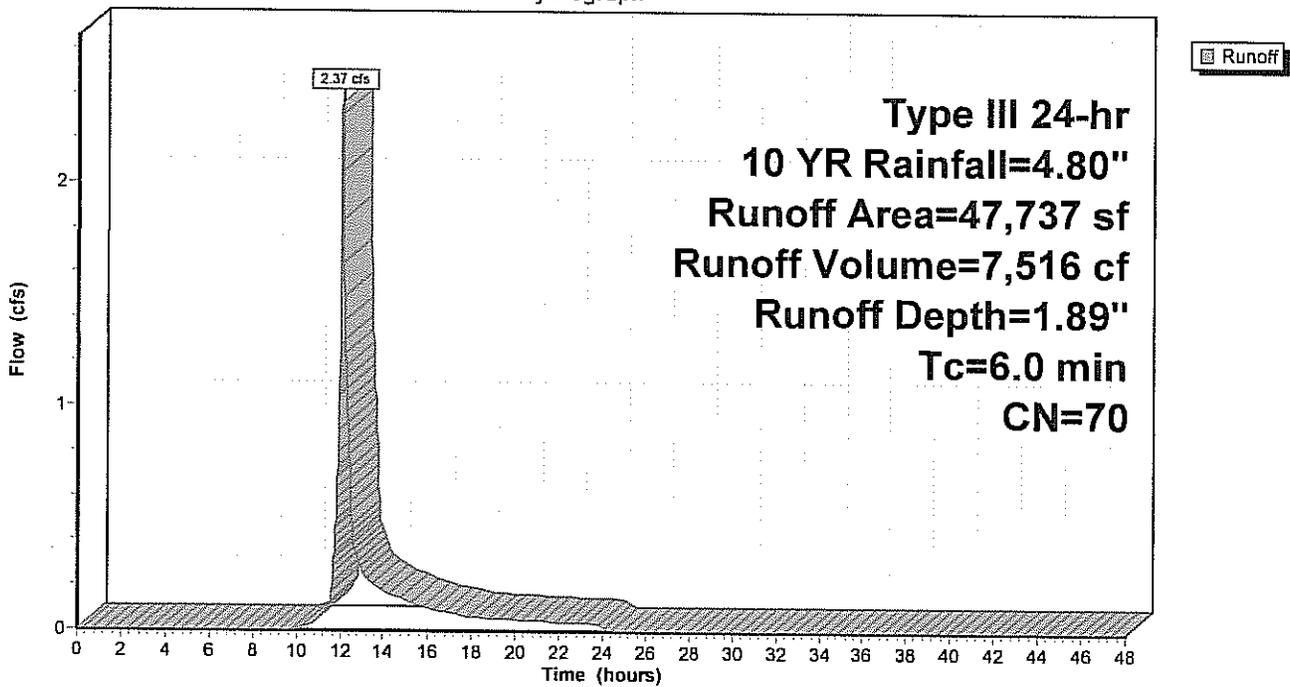
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.02 hrs  
 Type III 24-hr 10 YR Rainfall=4.80"

Area (sf)	CN	Description
942	89	Gravel roads, HSG C
46,795	70	Woods, Good, HSG C
47,737	70	Weighted Average
47,737		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					Direct Entry,

**Subcatchment POST 1A: Post Development Area 1A**

Hydrograph



**Summary for Subcatchment POST 2: Post Development Area 2**

Runoff = 16.47 cfs @ 12.08 hrs, Volume= 55,487 cf, Depth= 4.22"

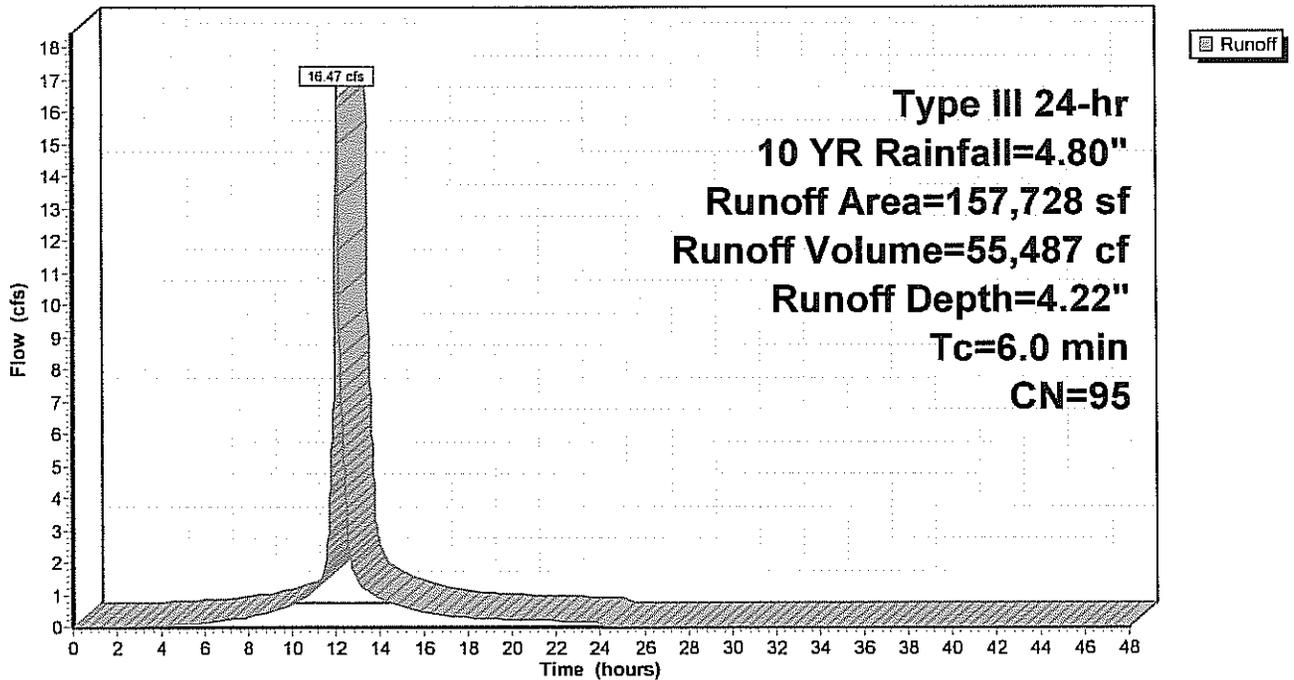
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.02 hrs  
 Type III 24-hr 10 YR Rainfall=4.80"

Area (sf)	CN	Description
3,154	89	Gravel roads, HSG C
59,037	98	Paved parking, HSG C
18,119	74	>75% Grass cover, Good, HSG C
77,418	98	Roofs, HSG C
157,728	95	Weighted Average
21,273		13.49% Pervious Area
136,455		86.51% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					Direct Entry,

**Subcatchment POST 2: Post Development Area 2**

Hydrograph



**Summary for Subcatchment POST 3: Post Development Area 3**

Runoff = 2.79 cfs @ 12.09 hrs, Volume= 8,873 cf, Depth= 3.58"

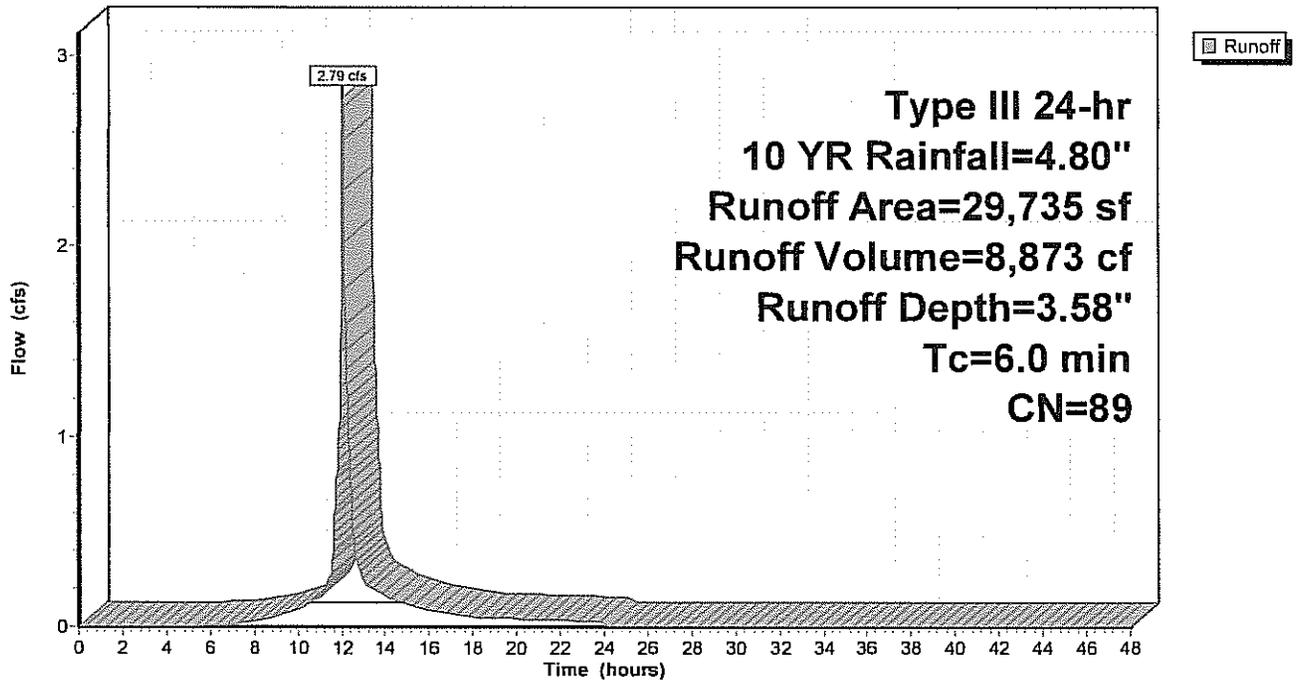
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.02 hrs  
 Type III 24-hr 10 YR Rainfall=4.80"

Area (sf)	CN	Description
18,773	98	Paved parking, HSG C
10,962	74	>75% Grass cover, Good, HSG C
29,735	89	Weighted Average
10,962		36.87% Pervious Area
18,773		63.13% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					Direct Entry,

**Subcatchment POST 3: Post Development Area 3**

Hydrograph



**Summary for Subcatchment POST 3A: Post Development Area 3A**

Runoff = 3.47 cfs @ 12.09 hrs, Volume= 10,758 cf, Depth= 2.72"

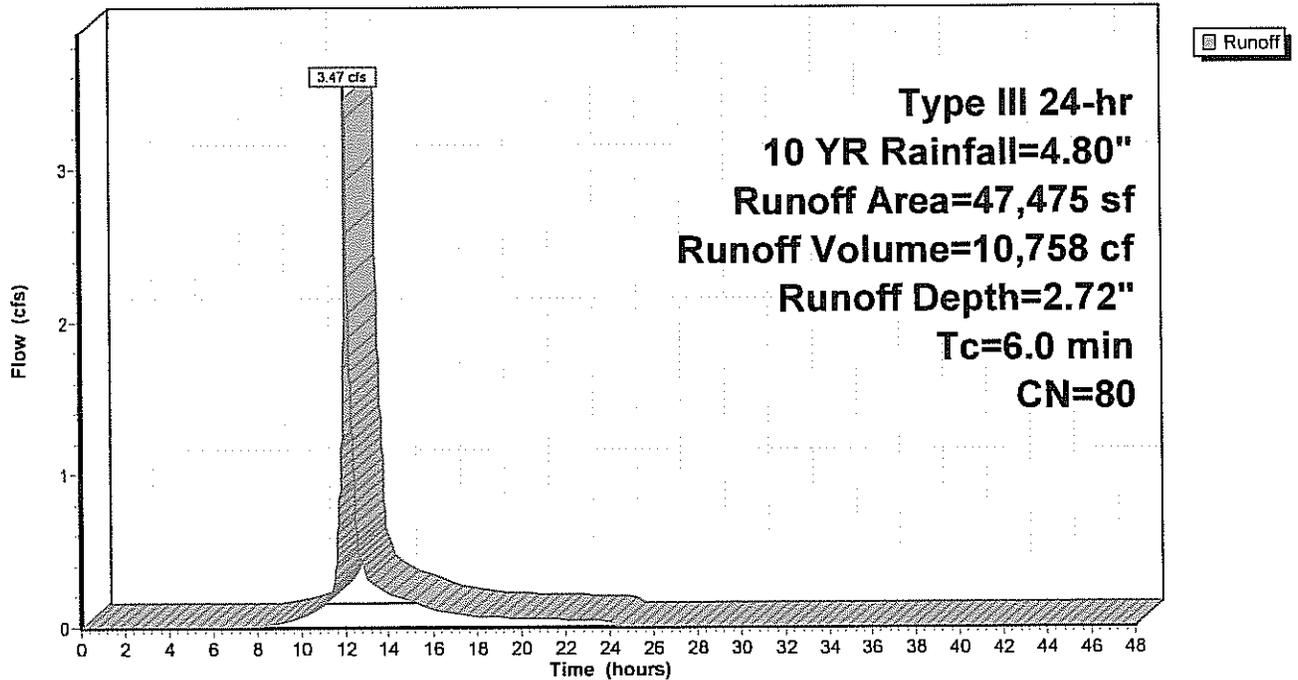
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.02 hrs  
 Type III 24-hr 10 YR Rainfall=4.80"

Area (sf)	CN	Description
14,950	98	Roofs, HSG C
1,689	98	Paved parking, HSG C
30,836	70	Woods, Good, HSG C
47,475	80	Weighted Average
30,836		64.95% Pervious Area
16,639		35.05% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					Direct Entry,

**Subcatchment POST 3A: Post Development Area 3A**

Hydrograph



**Summary for Subcatchment POST 4: Post Development Area 4**

Runoff = 8.65 cfs @ 12.08 hrs, Volume= 29,124 cf, Depth= 4.22"

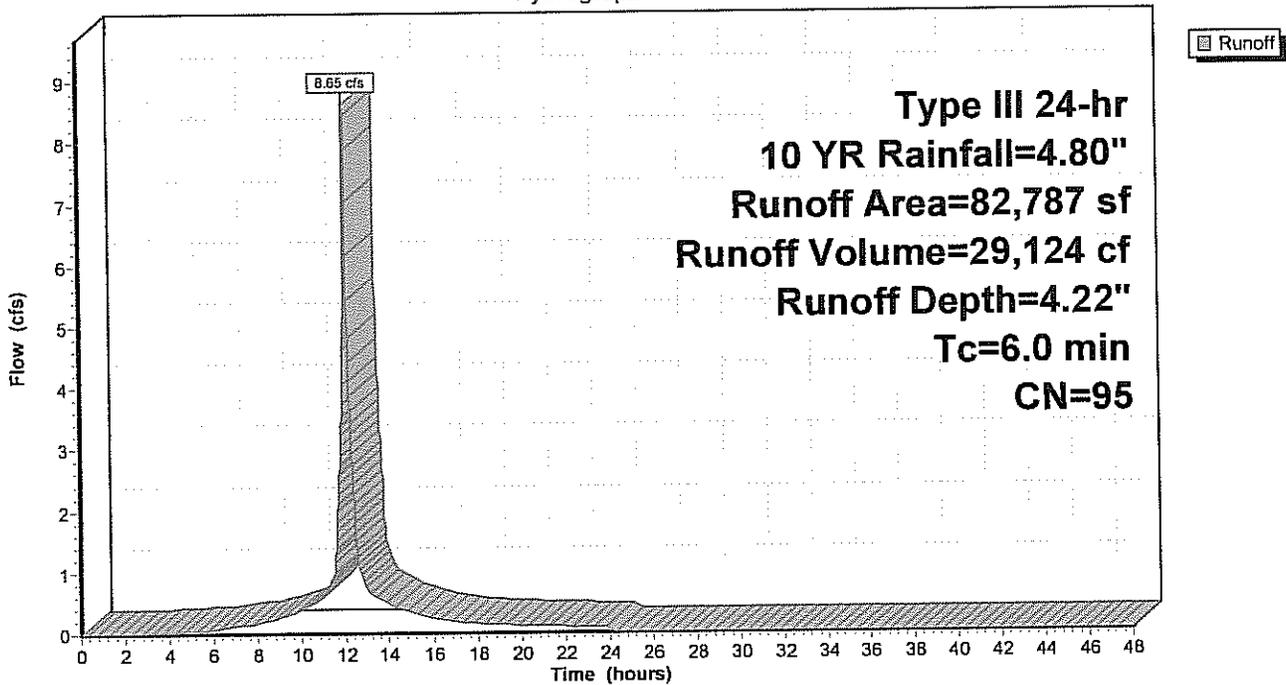
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.02 hrs  
 Type III 24-hr 10 YR Rainfall=4.80"

Area (sf)	CN	Description
70,785	98	Paved parking, HSG C
12,002	74	>75% Grass cover, Good, HSG C
82,787	95	Weighted Average
12,002		14.50% Pervious Area
70,785		85.50% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					Direct Entry,

**Subcatchment POST 4: Post Development Area 4**

Hydrograph



**Summary for Subcatchment POST 4A: Post Development Area 4A**

Runoff = 2.02 cfs @ 12.09 hrs, Volume= 6,333 cf, Depth= 2.12"

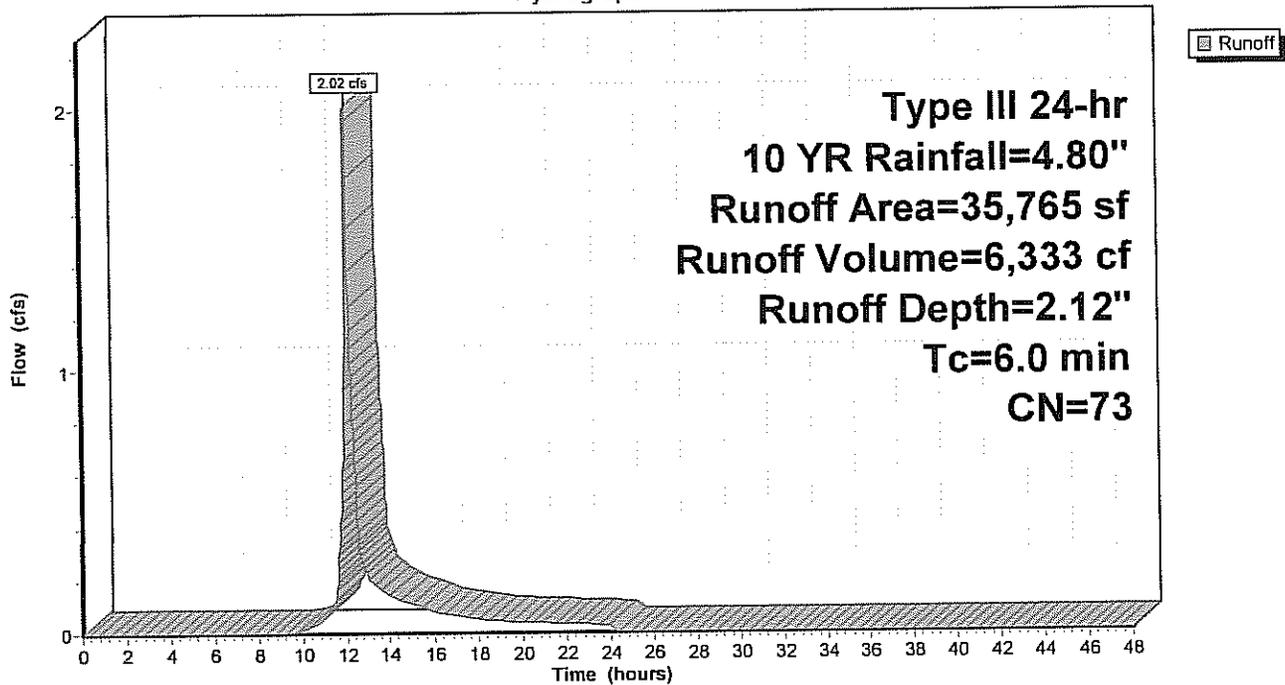
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.02 hrs  
 Type III 24-hr 10 YR Rainfall=4.80"

Area (sf)	CN	Description
32,116	70	Woods, Good, HSG C
3,649	98	Paved parking, HSG C
35,765	73	Weighted Average
32,116		89.80% Pervious Area
3,649		10.20% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					Direct Entry,

**Subcatchment POST 4A: Post Development Area 4A**

Hydrograph

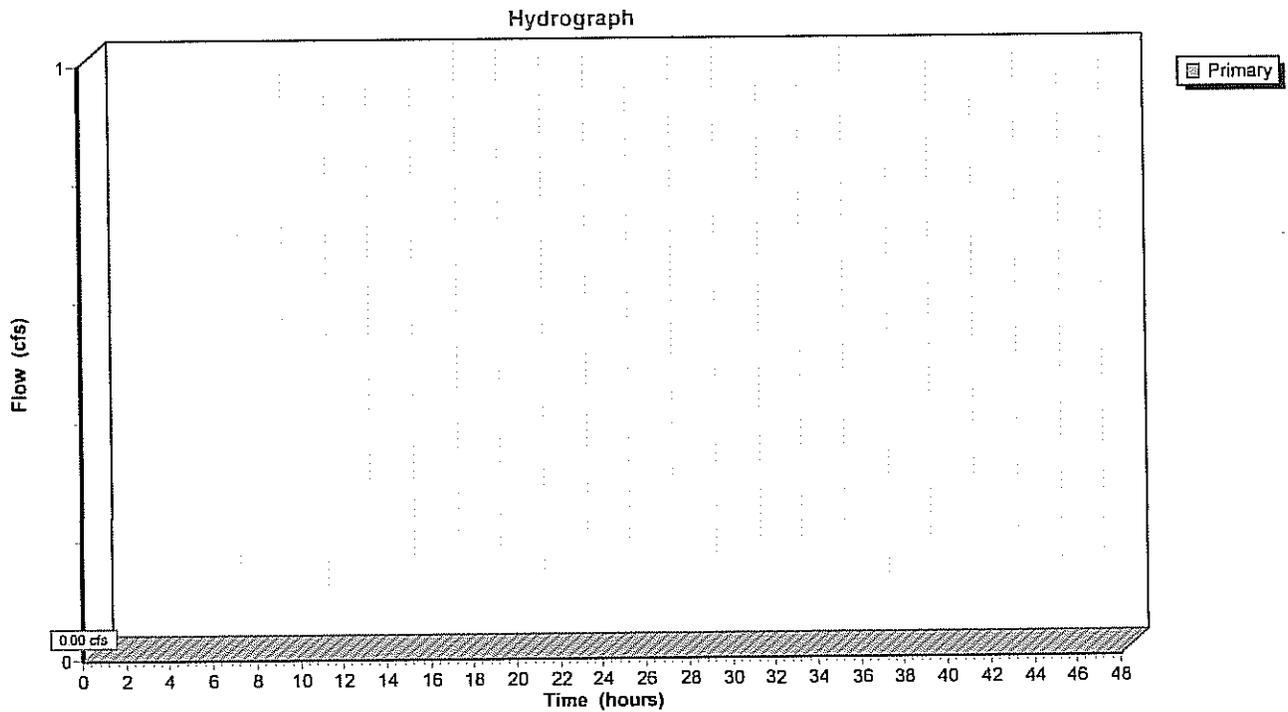


### Summary for Pond AP-1: WET-8 (No Flow)

[40] Hint: Not Described (Outflow=Inflow)

Primary OutFlow Max=0.00 cfs @ 0.00 hrs HW=0.00' TW=0.00' (Dynamic Tailwater)

### Pond AP-1: WET-8 (No Flow)



### Summary for Pond AP-2: WET-1

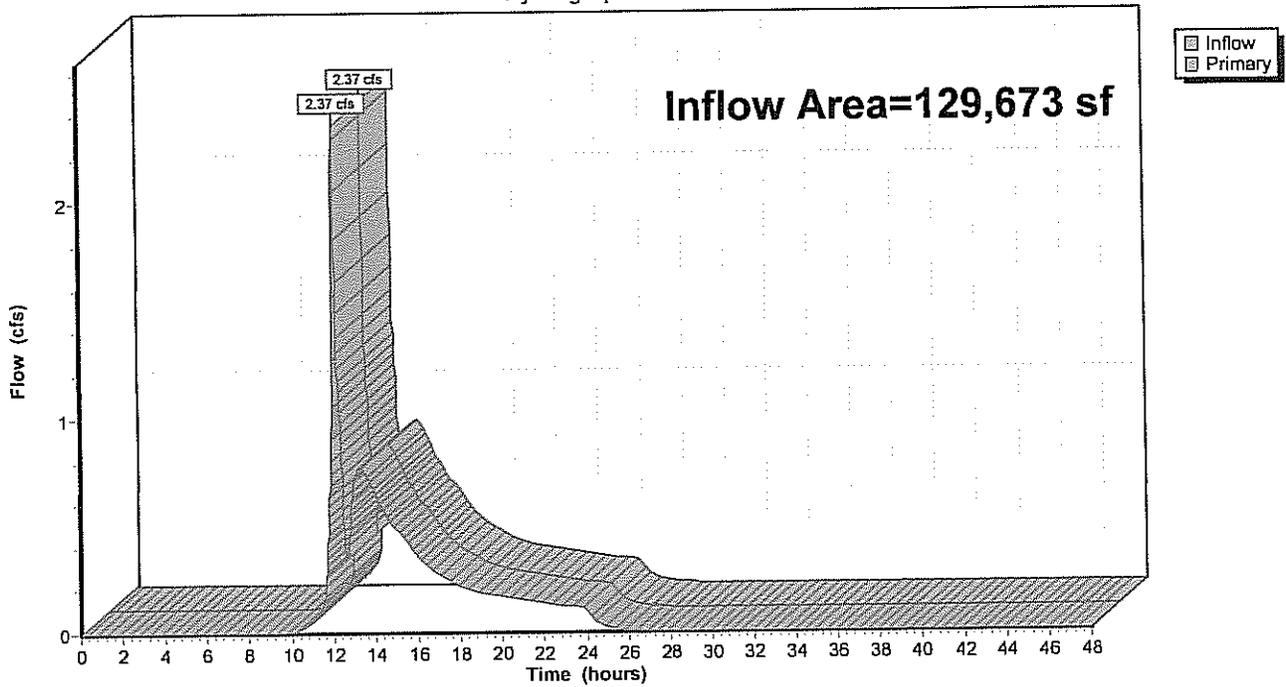
[40] Hint: Not Described (Outflow=Inflow)

Inflow Area = 129,673 sf, 2.72% Impervious, Inflow Depth = 1.49" for 10 YR event  
Inflow = 2.37 cfs @ 12.09 hrs, Volume= 16,099 cf  
Primary = 2.37 cfs @ 12.09 hrs, Volume= 16,099 cf, Atten= 0%, Lag= 0.0 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.02 hrs

### Pond AP-2: WET-1

Hydrograph



### Summary for Pond AP-3: Offsite-18"CMP

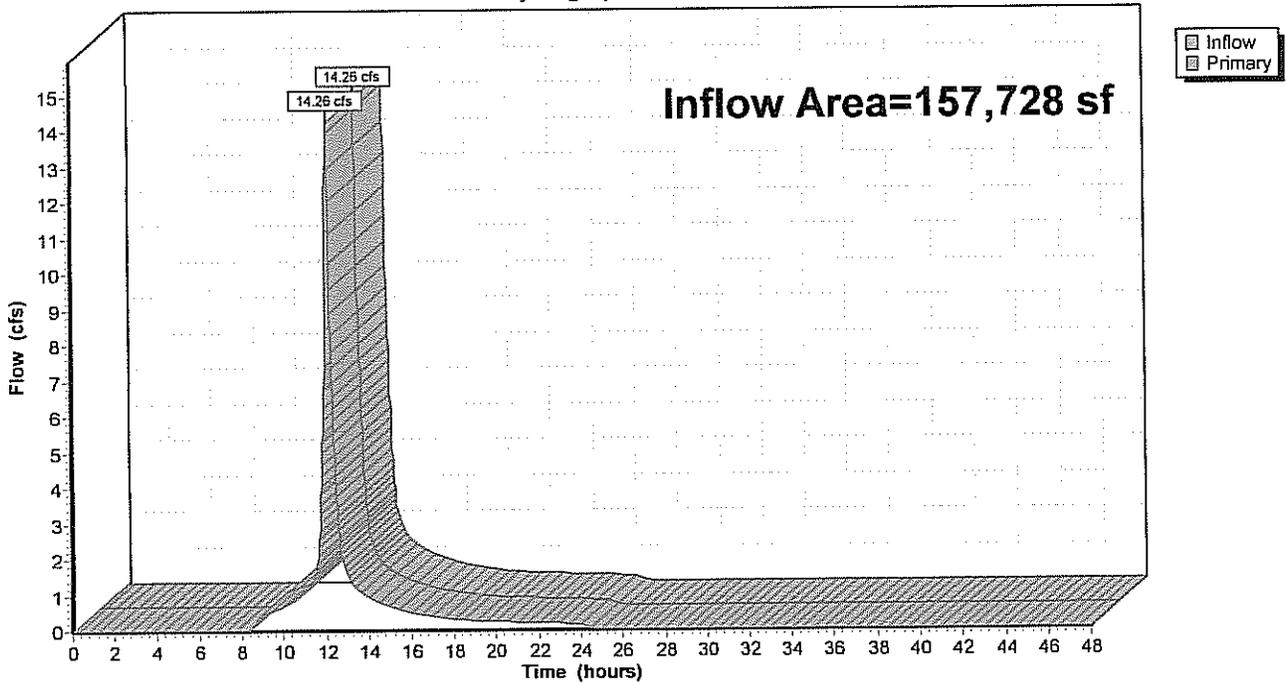
[40] Hint: Not Described (Outflow=Inflow)

Inflow Area = 157,728 sf, 86.51% Impervious, Inflow Depth = 3.98" for 10 YR event  
Inflow = 14.26 cfs @ 12.13 hrs, Volume= 52,374 cf  
Primary = 14.26 cfs @ 12.13 hrs, Volume= 52,374 cf, Atten= 0%, Lag= 0.0 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.02 hrs

### Pond AP-3: Offsite-18"CMP

Hydrograph



### Summary for Pond AP-4: WET-2

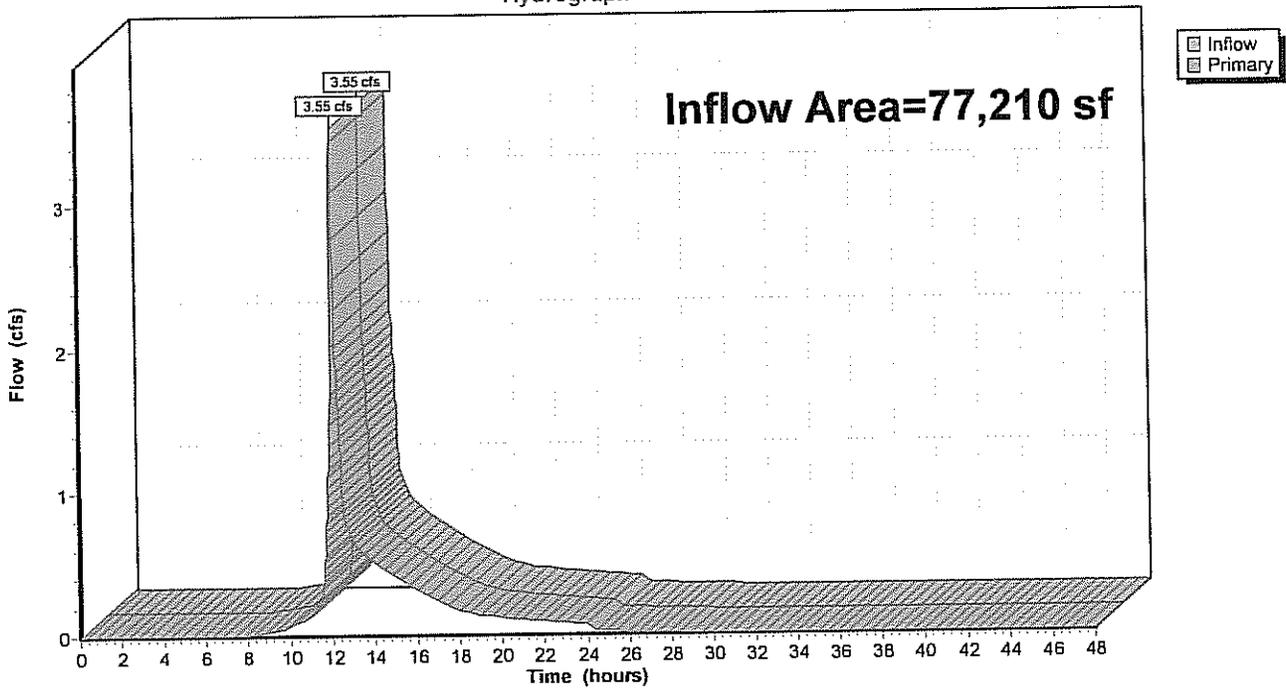
[40] Hint: Not Described (Outflow=Inflow)

Inflow Area = 77,210 sf, 45.86% Impervious, Inflow Depth > 2.66" for 10 YR event  
Inflow = 3.55 cfs @ 12.09 hrs, Volume= 17,093 cf  
Primary = 3.55 cfs @ 12.09 hrs, Volume= 17,093 cf, Atten= 0%, Lag= 0.0 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.02 hrs

### Pond AP-4: WET-2

Hydrograph



### Summary for Pond AP-5: WET-3

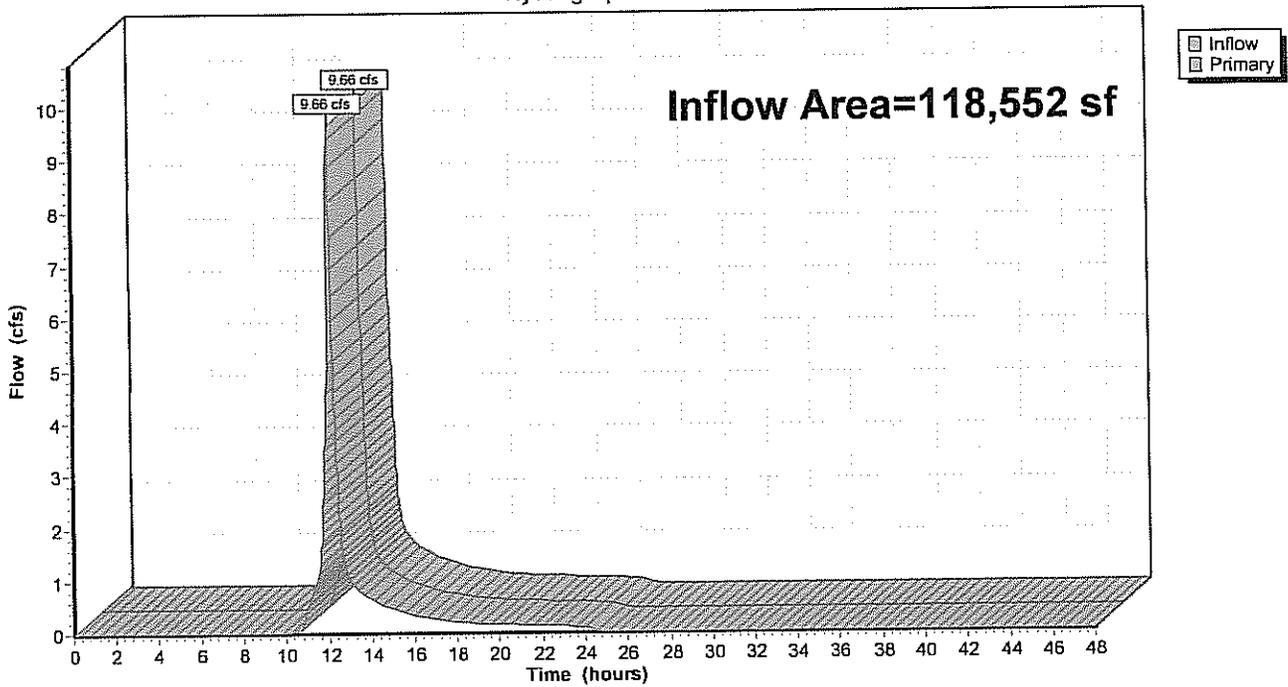
[40] Hint: Not Described (Outflow=Inflow)

Inflow Area = 118,552 sf, 62.79% Impervious, Inflow Depth = 3.13" for 10 YR event  
Inflow = 9.66 cfs @ 12.12 hrs, Volume= 30,950 cf  
Primary = 9.66 cfs @ 12.12 hrs, Volume= 30,950 cf, Atten= 0%, Lag= 0.0 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.02 hrs

### Pond AP-5: WET-3

Hydrograph



**Summary for Pond BASIN-1: BioRetention Area 1**

Inflow Area = 81,936 sf, 4.31% Impervious, Inflow Depth = 2.67" for 10 YR event  
 Inflow = 6.54 cfs @ 12.12 hrs, Volume= 18,235 cf  
 Outflow = 0.55 cfs @ 13.34 hrs, Volume= 8,583 cf, Atten= 92%, Lag= 73.2 min  
 Primary = 0.55 cfs @ 13.34 hrs, Volume= 8,583 cf

Routing by Dyn-Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.02 hrs  
 Peak Elev= 78.27' @ 13.34 hrs Surf.Area= 5,579 sf Storage= 10,310 cf  
 Flood Elev= 80.00' Surf.Area= 7,310 sf Storage= 21,444 cf

Plug-Flow detention time= 274.6 min calculated for 8,580 cf (47% of inflow)  
 Center-of-Mass det. time= 156.9 min ( 1,004.7 - 847.8 )

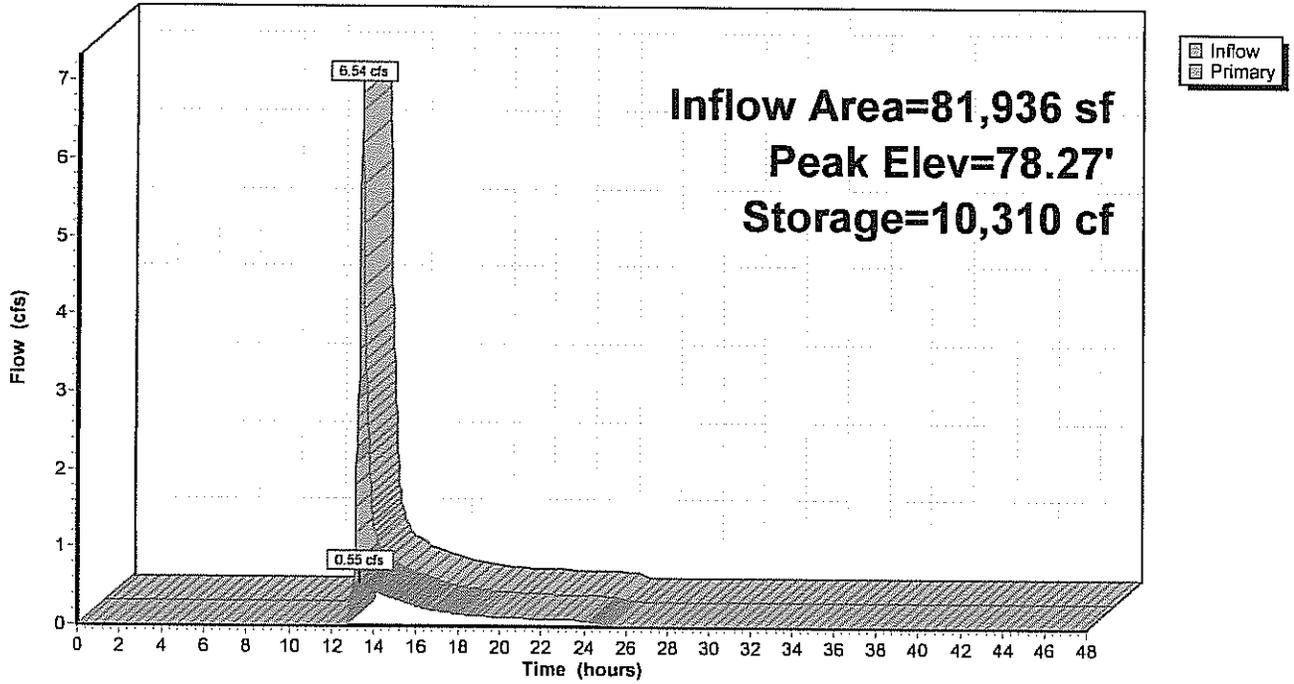
Volume	Invert	Avail.Storage	Storage Description
#1	76.00'	21,444 cf	Custom Stage Data (Prismatic) Listed below (Recalc)
Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
76.00	3,553	0	0
77.00	4,407	3,980	3,980
78.00	5,319	4,863	8,843
79.00	6,286	5,803	14,646
80.00	7,310	6,798	21,444

Device	Routing	Invert	Outlet Devices
#1	Primary	78.15'	5.0' long x 25.0' breadth Broad-Crested Rectangular Weir Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 Coef. (English) 2.68 2.70 2.70 2.64 2.63 2.64 2.64 2.63

Primary OutFlow Max=0.55 cfs @ 13.34 hrs HW=78.27' TW=0.00' (Dynamic Tailwater)  
 ↑1=Broad-Crested Rectangular Weir (Weir Controls 0.55 cfs @ 0.93 fps)

### Pond BASIN-1: BioRetention Area 1

Hydrograph



**Summary for Pond BASIN-2: BioRetention Area 2**

Inflow Area = 157,728 sf, 86.51% Impervious, Inflow Depth = 4.22" for 10 YR event  
 Inflow = 16.47 cfs @ 12.08 hrs, Volume= 55,487 cf  
 Outflow = 14.26 cfs @ 12.13 hrs, Volume= 52,374 cf, Atten= 13%, Lag= 2.8 min  
 Primary = 14.26 cfs @ 12.13 hrs, Volume= 52,374 cf

Routing by Dyn-Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.02 hrs  
 Peak Elev= 77.35' @ 12.13 hrs Surf.Area= 3,982 sf Storage= 7,205 cf  
 Flood Elev= 78.00' Surf.Area= 4,425 sf Storage= 9,083 cf

Plug-Flow detention time= 62.6 min calculated for 52,352 cf (94% of inflow)  
 Center-of-Mass det. time= 31.3 min ( 800.6 - 769.3 )

Volume	Invert	Avail.Storage	Storage Description
#1	74.50'	9,083 cf	<b>Custom Stage Data (Prismatic) Listed below (Recalc)</b>

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
74.50	0	0	0
75.00	1,805	451	451
76.00	2,690	2,248	2,699
77.00	3,632	3,161	5,860
77.80	4,425	3,223	9,083

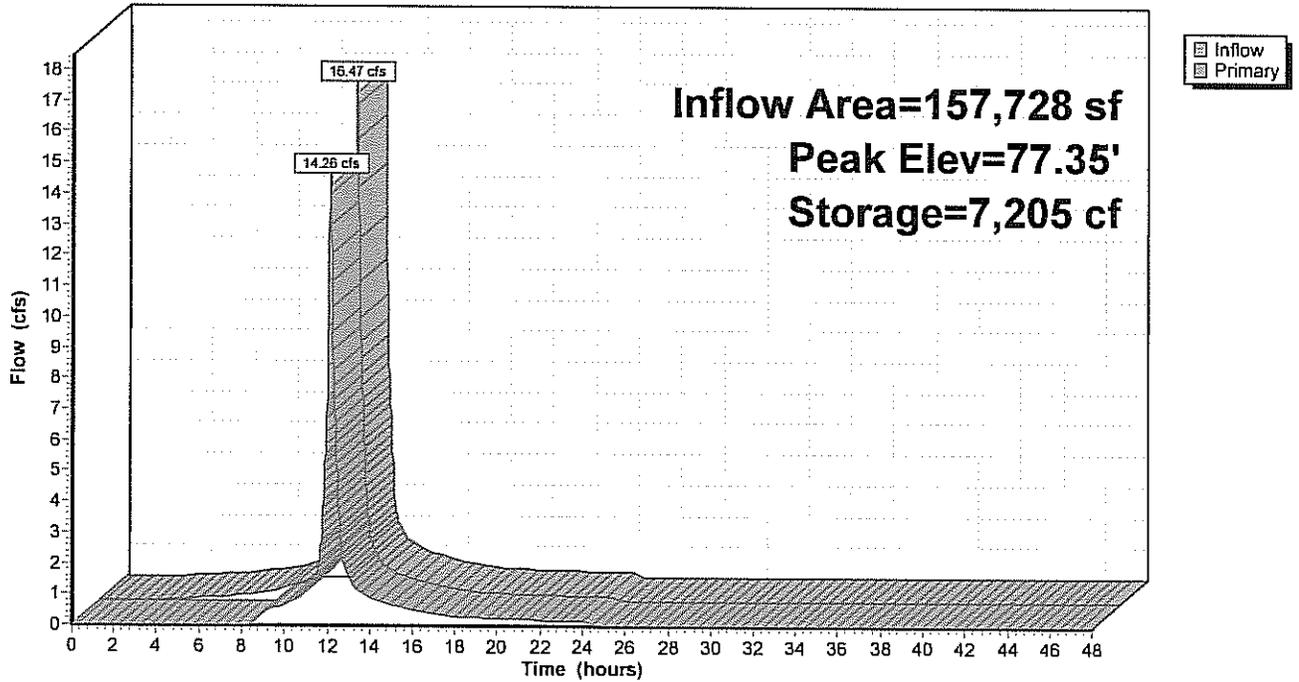
Device	Routing	Invert	Outlet Devices
#1	Primary	76.15'	<b>4.0' long x 2.0' breadth Broad-Crested Rectangular Weir</b> Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 3.00 3.50 Coef. (English) 2.54 2.61 2.61 2.60 2.66 2.70 2.77 2.89 2.88 2.85 3.07 3.20 3.32

Primary OutFlow Max=14.20 cfs @ 12.13 hrs HW=77.35' TW=0.00' (Dynamic Tailwater)

↑1=Broad-Crested Rectangular Weir (Weir Controls 14.20 cfs @ 2.96 fps)

### Pond BASIN-2: BioRetention Area 2

Hydrograph



**Summary for Pond BASIN-3: BioRetention Area 3**

Inflow Area = 29,735 sf, 63.13% Impervious, Inflow Depth = 3.20" for 10 YR event  
 Inflow = 2.74 cfs @ 12.10 hrs, Volume= 7,934 cf  
 Outflow = 0.31 cfs @ 12.80 hrs, Volume= 6,335 cf, Atten= 89%, Lag= 42.1 min  
 Primary = 0.31 cfs @ 12.80 hrs, Volume= 6,335 cf

Routing by Dyn-Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.02 hrs  
 Peak Elev= 76.22' @ 12.80 hrs Surf.Area= 3,788 sf Storage= 4,097 cf  
 Flood Elev= 78.00' Surf.Area= 5,167 sf Storage= 12,044 cf

Plug-Flow detention time= 239.8 min calculated for 6,335 cf (80% of inflow)  
 Center-of-Mass det. time= 164.4 min ( 990.0 - 825.6 )

Volume	Invert	Avail.Storage	Storage Description
#1	75.00'	12,044 cf	Custom Stage Data (Prismatic) Listed below (Recalc)
Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
75.00	2,938	0	0
76.00	3,624	3,281	3,281
77.00	4,367	3,996	7,277
78.00	5,167	4,767	12,044

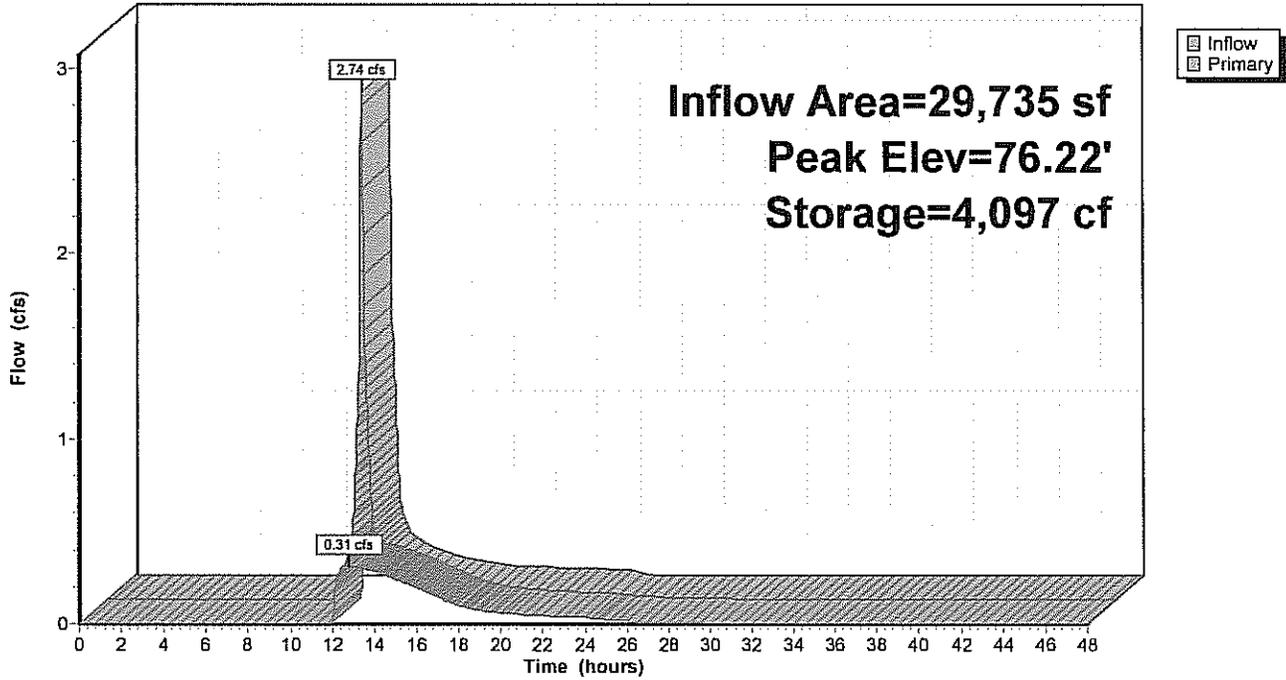
Device	Routing	Invert	Outlet Devices
#1	Primary	75.00'	<b>12.0" Round 12" HDPE</b> L= 30.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 75.00' / 74.80' S= 0.0067 ' / Cc= 0.900 n= 0.011 Concrete pipe, straight & clean, Flow Area= 0.79 sf
#2	Device 1	75.50'	<b>4.0" Vert. 4" Orifice</b> C= 0.600
#3	Device 1	76.50'	<b>4.0' long x 1.50' rise Sharp-Crested Rectangular Weir</b> 2 End Contraction(s) 1.5' Crest Height

Primary OutFlow Max=0.31 cfs @ 12.80 hrs HW=76.22' TW=0.00' (Dynamic Tailwater)

- 1=12" HDPE (Passes 0.31 cfs of 3.01 cfs potential flow)
- 2=4" Orifice (Orifice Controls 0.31 cfs @ 3.58 fps)
- 3=Sharp-Crested Rectangular Weir ( Controls 0.00 cfs)

### Pond BASIN-3: BioRetention Area 3

Hydrograph



**Summary for Pond BASIN-4: BioRetention Area 4**

Inflow Area = 82,787 sf, 85.50% Impervious, Inflow Depth = 4.04" for 10 YR event  
 Inflow = 8.44 cfs @ 12.09 hrs, Volume= 27,850 cf  
 Outflow = 7.76 cfs @ 12.13 hrs, Volume= 24,617 cf, Atten= 8%, Lag= 2.2 min  
 Primary = 7.76 cfs @ 12.13 hrs, Volume= 24,617 cf

Routing by Dyn-Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.02 hrs  
 Peak Elev= 78.45' @ 12.13 hrs Surf.Area= 3,945 sf Storage= 4,926 cf  
 Flood Elev= 79.00' Surf.Area= 4,374 sf Storage= 7,218 cf

Plug-Flow detention time= 88.4 min calculated for 24,617 cf (88% of inflow)  
 Center-of-Mass det. time= 35.0 min ( 823.6 - 788.6 )

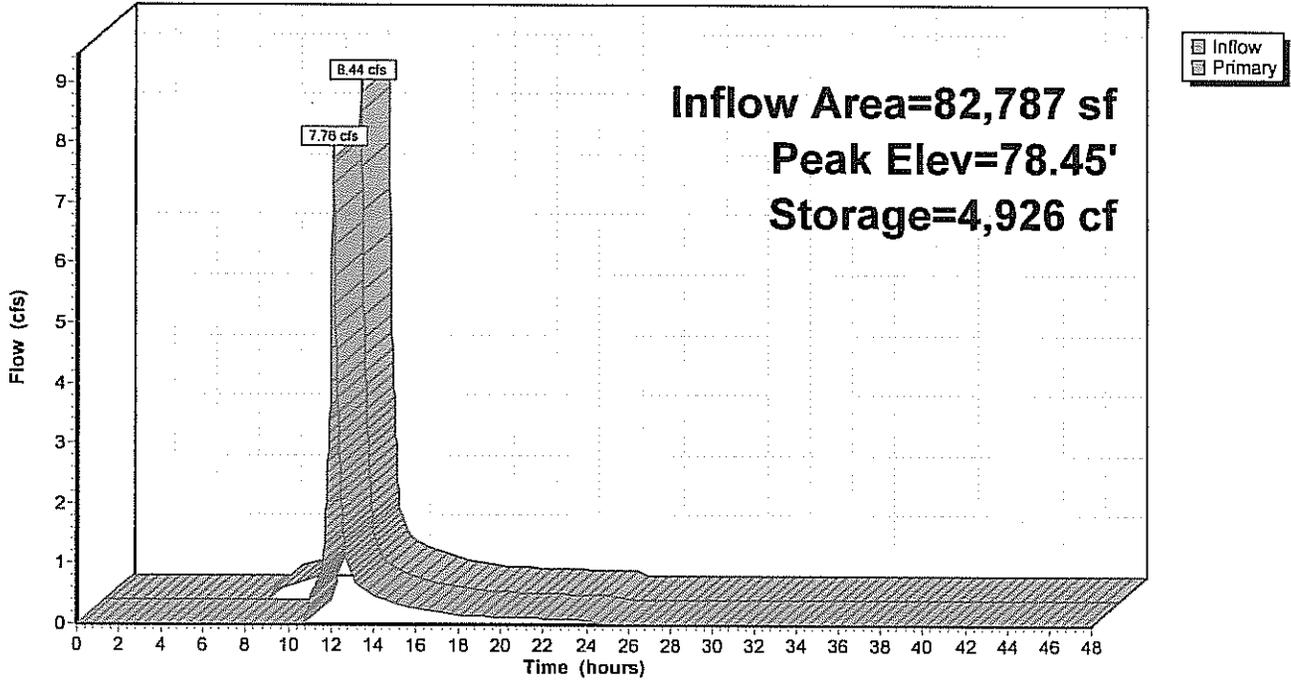
Volume	Invert	Avail.Storage	Storage Description
#1	77.00'	7,218 cf	Custom Stage Data (Prismatic) Listed below (Recalc)
Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
77.00	2,871	0	0
78.00	3,595	3,233	3,233
79.00	4,374	3,985	7,218

Device	Routing	Invert	Outlet Devices
#1	Primary	78.00'	<b>10.0' long x 8.0' breadth Broad-Crested Rectangular Weir</b> Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 3.00 3.50 4.00 4.50 5.00 5.50 Coef. (English) 2.43 2.54 2.70 2.69 2.68 2.68 2.66 2.64 2.64 2.64 2.65 2.65 2.66 2.66 2.68 2.70 2.74

Primary OutFlow Max=7.73 cfs @ 12.13 hrs HW=78.45' TW=0.00' (Dynamic Tailwater)  
 ↑1=Broad-Crested Rectangular Weir (Weir Controls 7.73 cfs @ 1.73 fps)

### Pond BASIN-4: BioRetention Area 4

Hydrograph



**Summary for Pond FB-1: Forebay**

Inflow Area = 81,936 sf, 4.31% Impervious, Inflow Depth = 3.18" for 10 YR event  
 Inflow = 6.95 cfs @ 12.09 hrs, Volume= 21,738 cf  
 Outflow = 6.54 cfs @ 12.12 hrs, Volume= 18,235 cf, Atten= 6%, Lag= 1.8 min  
 Primary = 6.54 cfs @ 12.12 hrs, Volume= 18,235 cf

Routing by Dyn-Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.02 hrs  
 Peak Elev= 78.81' @ 12.12 hrs Surf.Area= 2,841 sf Storage= 4,595 cf  
 Flood Elev= 79.00' Surf.Area= 2,991 sf Storage= 5,158 cf

Plug-Flow detention time= 105.6 min calculated for 18,228 cf (84% of inflow)  
 Center-of-Mass det. time= 38.7 min ( 847.8 - 809.1 )

Volume	Invert	Avail.Storage	Storage Description
#1	76.50'	5,158 cf	Custom Stage Data (Prismatic) Listed below (Recalc)
Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
76.50	1,200	0	0
77.00	1,518	680	680
78.00	2,227	1,873	2,552
78.50	2,602	1,207	3,759
79.00	2,991	1,398	5,158

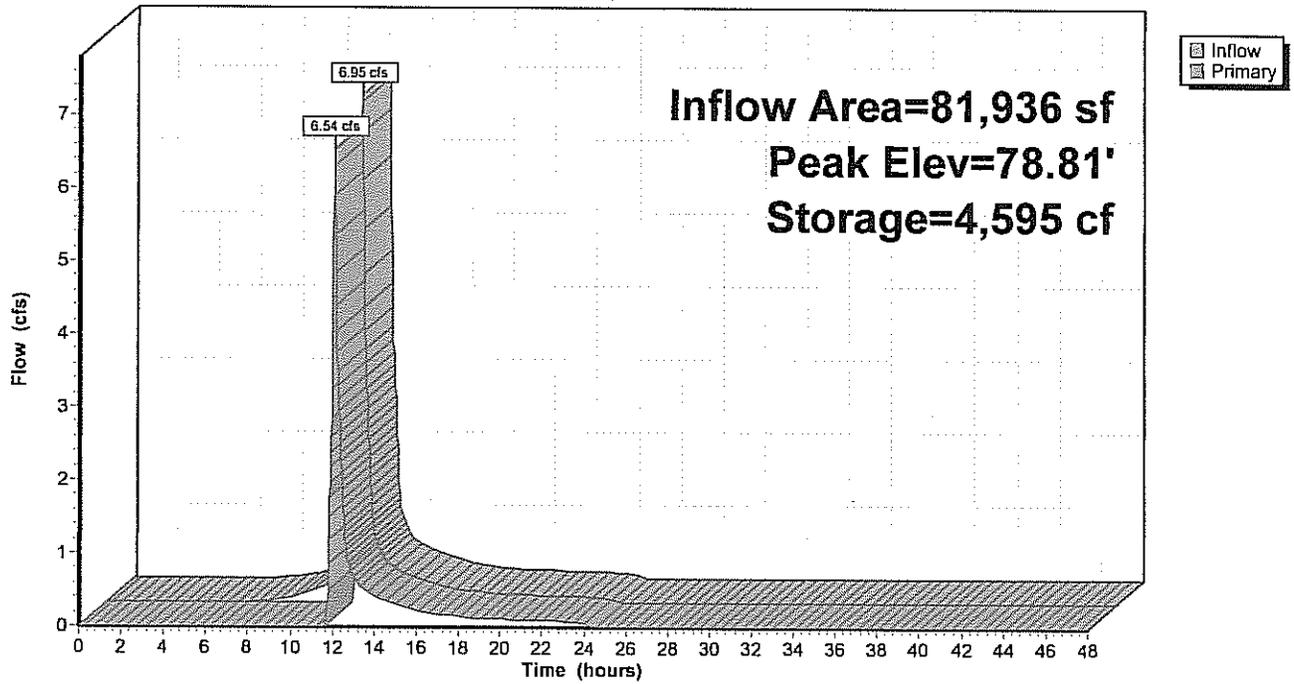
Device	Routing	Invert	Outlet Devices
#1	Primary	78.40'	<b>10.0' long x 6.0' breadth Broad-Crested Rectangular Weir</b> Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 3.00 3.50 4.00 4.50 5.00 5.50 Coef. (English) 2.37 2.51 2.70 2.68 2.68 2.67 2.65 2.65 2.65 2.65 2.66 2.66 2.67 2.69 2.72 2.76 2.83

Primary OutFlow Max=6.52 cfs @ 12.12 hrs HW=78.81' TW=76.90' (Dynamic Tailwater)

↑1=Broad-Crested Rectangular Weir (Weir Controls 6.52 cfs @ 1.60 fps)

### Pond FB-1: Forebay

Hydrograph



**Summary for Pond FB-2: Forebay**

Inflow Area = 29,735 sf, 63.13% Impervious, Inflow Depth = 3.58" for 10 YR event  
 Inflow = 2.79 cfs @ 12.09 hrs, Volume= 8,873 cf  
 Outflow = 2.74 cfs @ 12.10 hrs, Volume= 7,934 cf, Atten= 2%, Lag= 0.9 min  
 Primary = 2.74 cfs @ 12.10 hrs, Volume= 7,934 cf

Routing by Dyn-Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.02 hrs  
 Peak Elev= 76.84' @ 12.10 hrs Surf.Area= 926 sf Storage= 1,149 cf  
 Flood Elev= 77.00' Surf.Area= 982 sf Storage= 1,304 cf

Plug-Flow detention time= 80.2 min calculated for 7,931 cf (89% of inflow)  
 Center-of-Mass det. time= 29.8 min ( 825.6 - 795.8 )

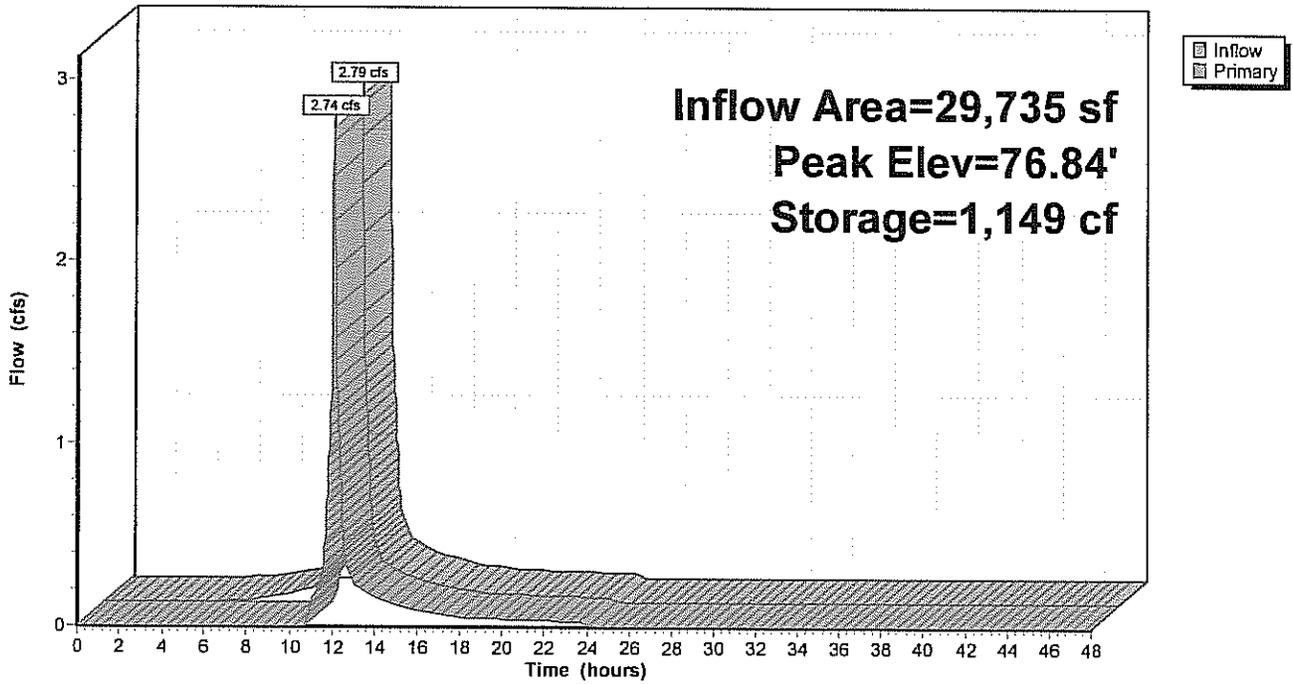
Volume	Invert	Avail.Storage	Storage Description
#1	75.00'	1,304 cf	Custom Stage Data (Prismatic) Listed below (Recalc)
Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
75.00	350	0	0
76.00	638	494	494
77.00	982	810	1,304

Device	Routing	Invert	Outlet Devices
#1	Primary	76.60'	<b>10.0' long x 5.0' breadth Broad-Crested Rectangular Weir</b> Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 3.00 3.50 4.00 4.50 5.00 5.50 Coef. (English) 2.34 2.50 2.70 2.68 2.68 2.66 2.65 2.65 2.65 2.65 2.67 2.66 2.68 2.70 2.74 2.79 2.88

Primary OutFlow Max=2.74 cfs @ 12.10 hrs HW=76.84' TW=75.73' (Dynamic Tailwater)  
 ↑1=Broad-Crested Rectangular Weir (Weir Controls 2.74 cfs @ 1.15 fps)

### Pond FB-2: Forebay

Hydrograph



**Summary for Pond FB-3: Forebay**

Inflow Area = 82,787 sf, 85.50% Impervious, Inflow Depth = 4.22" for 10 YR event  
 Inflow = 8.65 cfs @ 12.08 hrs, Volume= 29,124 cf  
 Outflow = 8.44 cfs @ 12.09 hrs, Volume= 27,850 cf, Atten= 2%, Lag= 0.3 min  
 Primary = 8.44 cfs @ 12.09 hrs, Volume= 27,850 cf

Routing by Dyn-Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.02 hrs  
 Peak Elev= 78.52' @ 12.12 hrs Surf.Area= 1,321 sf Storage= 1,552 cf  
 Flood Elev= 78.80' Surf.Area= 1,439 sf Storage= 1,941 cf

Plug-Flow detention time= 44.7 min calculated for 27,838 cf (96% of inflow)  
 Center-of-Mass det. time= 19.3 min ( 788.6 - 769.3 )

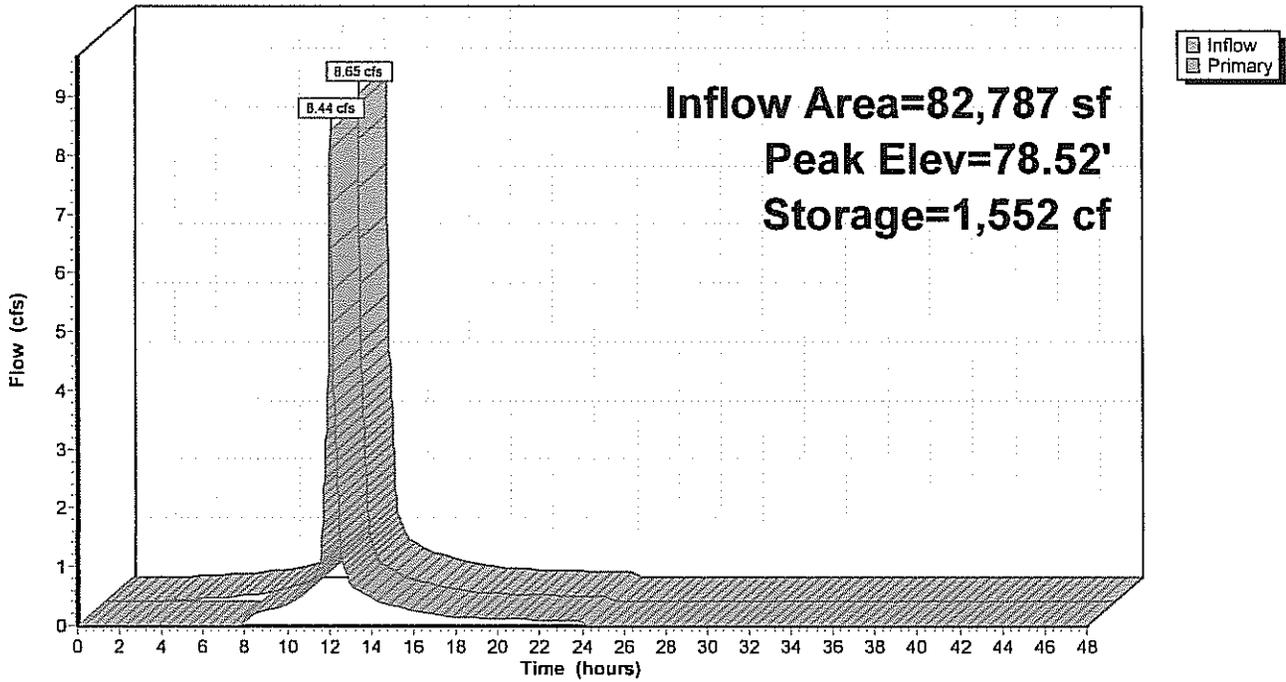
Volume	Invert	Avail.Storage	Storage Description
#1	77.00'	1,941 cf	Custom Stage Data (Prismatic) Listed below (Recalc)
Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
77.00	743	0	0
78.00	1,104	924	924
78.80	1,439	1,017	1,941

Device	Routing	Invert	Outlet Devices
#1	Primary	78.30'	<b>38.0' long x 1.0' breadth Broad-Crested Rectangular Weir</b> Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 3.00 Coef. (English) 2.69 2.72 2.75 2.85 2.98 3.08 3.20 3.28 3.31 3.30 3.31 3.32

Primary OutFlow Max=7.66 cfs @ 12.09 hrs HW=78.51' TW=78.43' (Dynamic Tailwater)  
 ↑1=Broad-Crested Rectangular Weir (Weir Controls 7.66 cfs @ 0.96 fps)

### Pond FB-3: Forebay

Hydrograph



Time span=0.00-48.00 hrs, dt=0.02 hrs, 2401 points  
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN  
Reach routing by Dyn-Stor-Ind method - Pond routing by Dyn-Stor-Ind method

**Subcatchment POST 1: Post Development** Runoff Area=81,936 sf 4.31% Impervious Runoff Depth=3.83"  
Tc=6.0 min CN=85 Runoff=8.32 cfs 26,171 cf

**Subcatchment POST 1A: Post Development** Runoff Area=47,737 sf 0.00% Impervious Runoff Depth=2.41"  
Tc=6.0 min CN=70 Runoff=3.06 cfs 9,604 cf

**Subcatchment POST 2: Post** Runoff Area=157,728 sf 86.51% Impervious Runoff Depth=4.92"  
Tc=6.0 min CN=95 Runoff=19.02 cfs 64,605 cf

**Subcatchment POST 3: Post Development** Runoff Area=29,735 sf 63.13% Impervious Runoff Depth=4.25"  
Tc=6.0 min CN=89 Runoff=3.28 cfs 10,537 cf

**Subcatchment POST 3A: Post** Runoff Area=47,475 sf 35.05% Impervious Runoff Depth=3.33"  
Tc=6.0 min CN=80 Runoff=4.25 cfs 13,187 cf

**Subcatchment POST 4: Post Development** Runoff Area=82,787 sf 85.50% Impervious Runoff Depth=4.92"  
Tc=6.0 min CN=95 Runoff=9.98 cfs 33,910 cf

**Subcatchment POST 4A: Post** Runoff Area=35,765 sf 10.20% Impervious Runoff Depth=2.68"  
Tc=6.0 min CN=73 Runoff=2.56 cfs 7,984 cf

**Pond AP-1: WET-8 (No Flow)** Primary=0.00 cfs 0 cf

**Pond AP-2: WET-1** Inflow=3.06 cfs 22,620 cf  
Primary=3.06 cfs 22,620 cf

**Pond AP-3: Offsite-18"CMP** Inflow=16.64 cfs 61,493 cf  
Primary=16.64 cfs 61,493 cf

**Pond AP-4: WET-2** Inflow=4.45 cfs 21,186 cf  
Primary=4.45 cfs 21,186 cf

**Pond AP-5: WET-3** Inflow=11.42 cfs 37,387 cf  
Primary=11.42 cfs 37,387 cf

**Pond BASIN-1: BioRetention Area 1** Peak Elev=78.39' Storage=11,010 cf Inflow=7.88 cfs 22,668 cf  
Outflow=1.61 cfs 13,016 cf

**Pond BASIN-2: BioRetention Area 2** Peak Elev=77.47' Storage=7,677 cf Inflow=19.02 cfs 64,605 cf  
Outflow=16.64 cfs 61,493 cf

**Pond BASIN-3: BioRetention Area 3** Peak Elev=76.46' Storage=5,042 cf Inflow=3.23 cfs 9,598 cf  
Outflow=0.38 cfs 7,999 cf

**Pond BASIN-4: BioRetention Area 4** Peak Elev=78.49' Storage=5,093 cf Inflow=9.71 cfs 32,636 cf  
Outflow=9.00 cfs 29,403 cf

**1998-POST-WS**

Type III 24-hr 25 YR Rainfall=5.50"

Prepared by Field Engineering Co. Inc.

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**Pond FB-1: Forebay** Peak Elev=78.86' Storage=4,734 cf Inflow=8.32 cfs 26,171 cf  
Outflow=7.88 cfs 22,668 cf

**Pond FB-2: Forebay** Peak Elev=76.86' Storage=1,173 cf Inflow=3.28 cfs 10,537 cf  
Outflow=3.23 cfs 9,598 cf

**Pond FB-3: Forebay** Peak Elev=78.55' Storage=1,598 cf Inflow=9.98 cfs 33,910 cf  
Outflow=9.71 cfs 32,636 cf

**Total Runoff Area = 483,163 sf Runoff Volume = 165,999 cf Average Runoff Depth = 4.12"**  
**48.29% Pervious = 233,334 sf 51.71% Impervious = 249,829 sf**

**Summary for Subcatchment POST 1: Post Development Area 1**

Runoff = 8.32 cfs @ 12.09 hrs, Volume= 26,171 cf, Depth= 3.83"

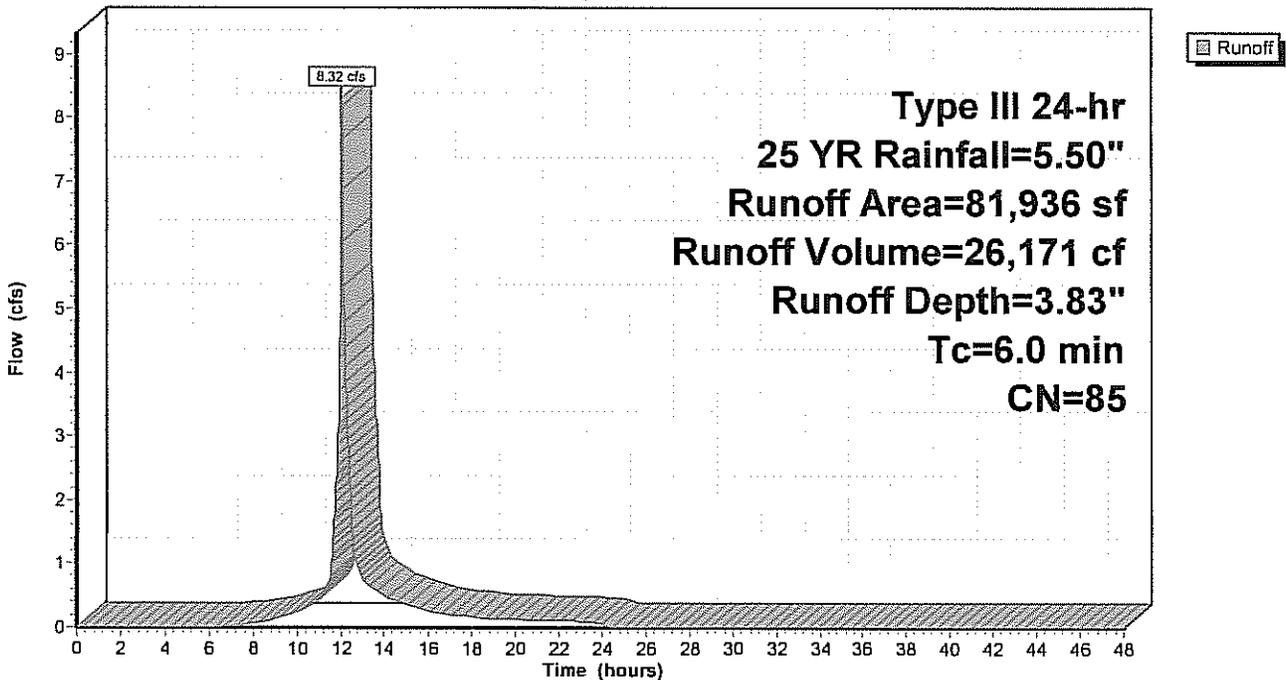
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.02 hrs  
 Type III 24-hr 25 YR Rainfall=5.50"

Area (sf)	CN	Description
51,749	89	Gravel roads, HSG C
3,528	98	Paved parking, HSG C
26,659	74	>75% Grass cover, Good, HSG C
81,936	85	Weighted Average
78,408		95.69% Pervious Area
3,528		4.31% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					Direct Entry,

**Subcatchment POST 1: Post Development Area 1**

Hydrograph



**Summary for Subcatchment POST 1A: Post Development Area 1A**

Runoff = 3.06 cfs @ 12.09 hrs, Volume= 9,604 cf, Depth= 2.41"

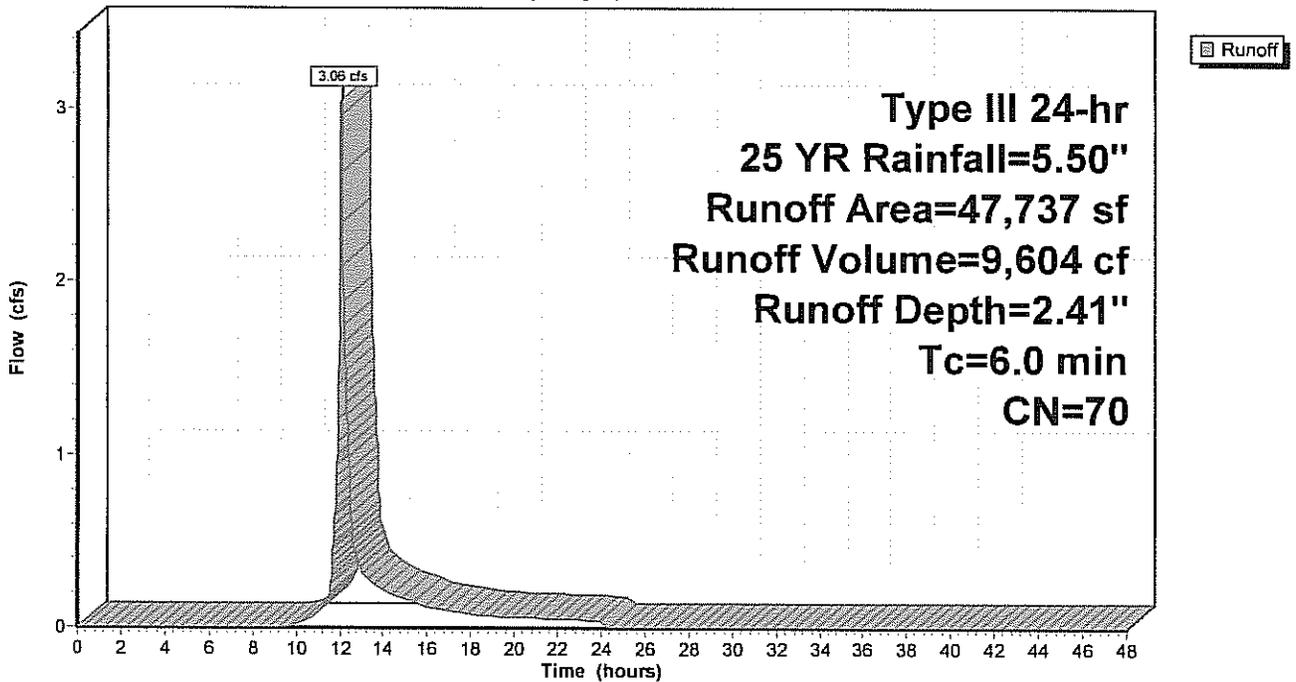
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.02 hrs  
 Type III 24-hr 25 YR Rainfall=5.50"

Area (sf)	CN	Description
942	89	Gravel roads, HSG C
46,795	70	Woods, Good, HSG C
47,737	70	Weighted Average
47,737		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					Direct Entry,

**Subcatchment POST 1A: Post Development Area 1A**

Hydrograph



**Summary for Subcatchment POST 2: Post Development Area 2**

Runoff = 19.02 cfs @ 12.08 hrs, Volume= 64,605 cf, Depth= 4.92"

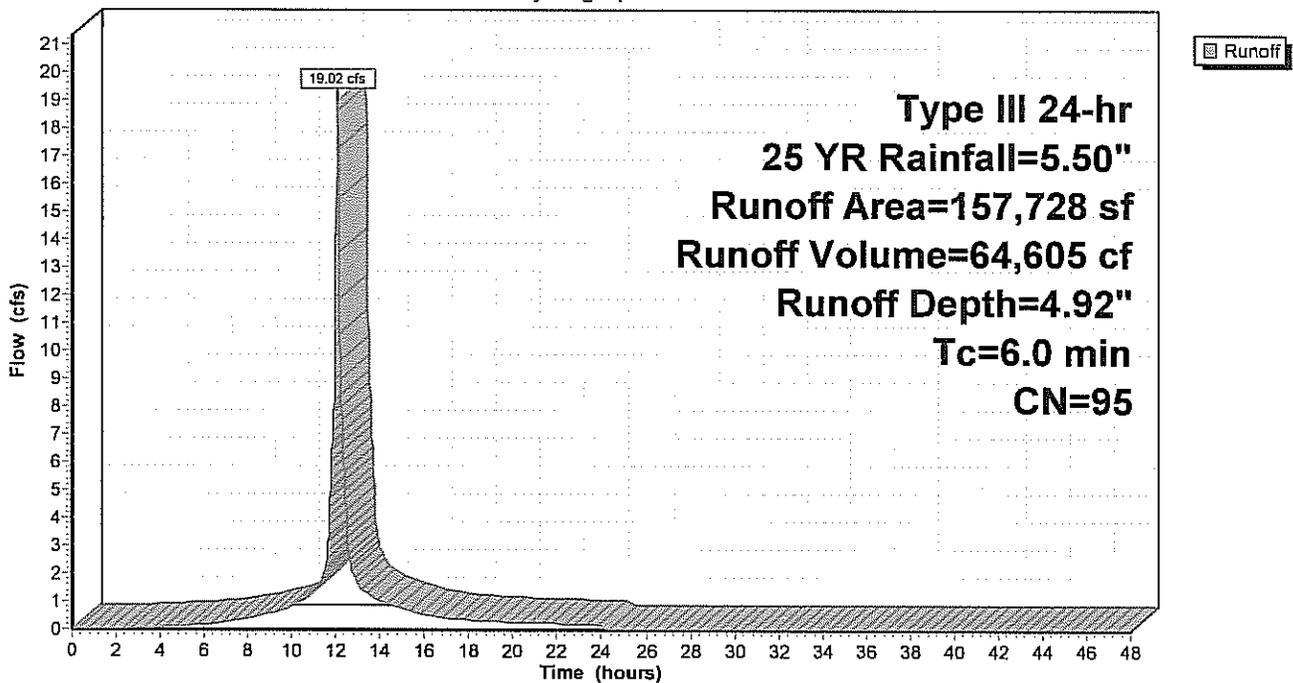
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.02 hrs  
 Type III 24-hr 25 YR Rainfall=5.50"

Area (sf)	CN	Description
3,154	89	Gravel roads, HSG C
59,037	98	Paved parking, HSG C
18,119	74	>75% Grass cover, Good, HSG C
77,418	98	Roofs, HSG C
157,728	95	Weighted Average
21,273		13.49% Pervious Area
136,455		86.51% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					Direct Entry,

**Subcatchment POST 2: Post Development Area 2**

Hydrograph



**Summary for Subcatchment POST 3: Post Development Area 3**

Runoff = 3.28 cfs @ 12.09 hrs, Volume= 10,537 cf, Depth= 4.25"

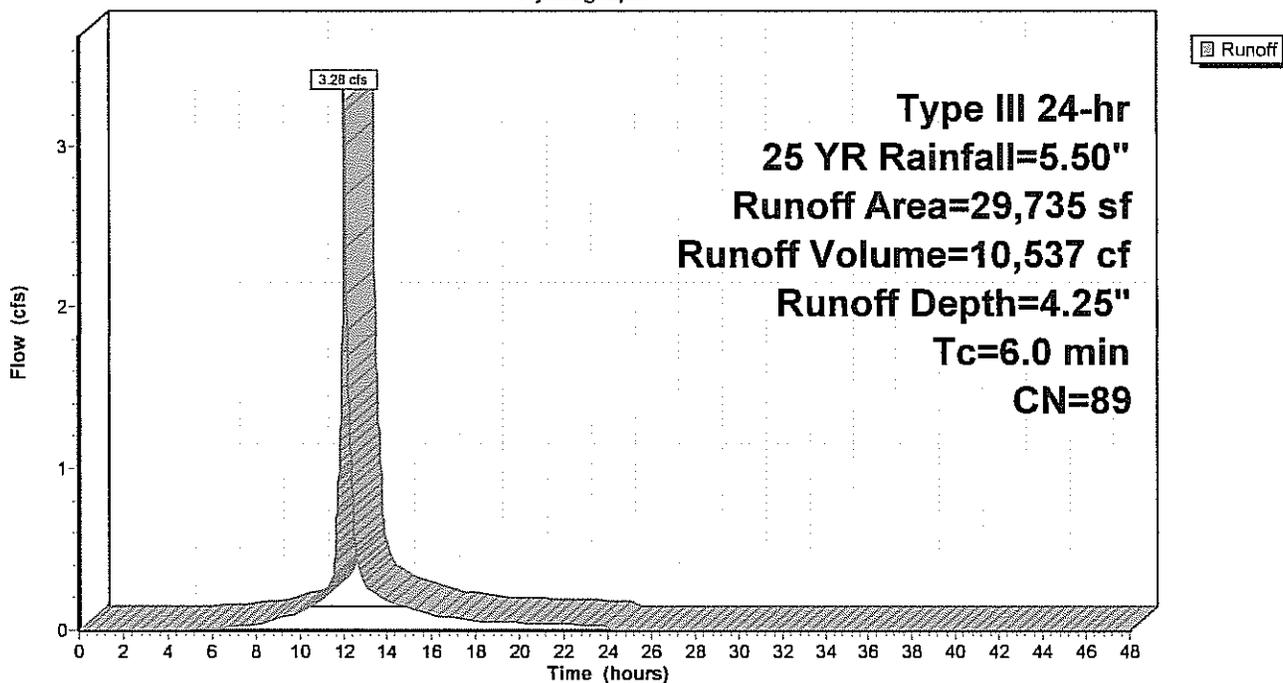
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.02 hrs  
 Type III 24-hr 25 YR Rainfall=5.50"

Area (sf)	CN	Description
18,773	98	Paved parking, HSG C
10,962	74	>75% Grass cover, Good, HSG C
29,735	89	Weighted Average
10,962		36.87% Pervious Area
18,773		63.13% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					Direct Entry,

**Subcatchment POST 3: Post Development Area 3**

Hydrograph



**Summary for Subcatchment POST 3A: Post Development Area 3A**

Runoff = 4.25 cfs @ 12.09 hrs, Volume= 13,187 cf, Depth= 3.33"

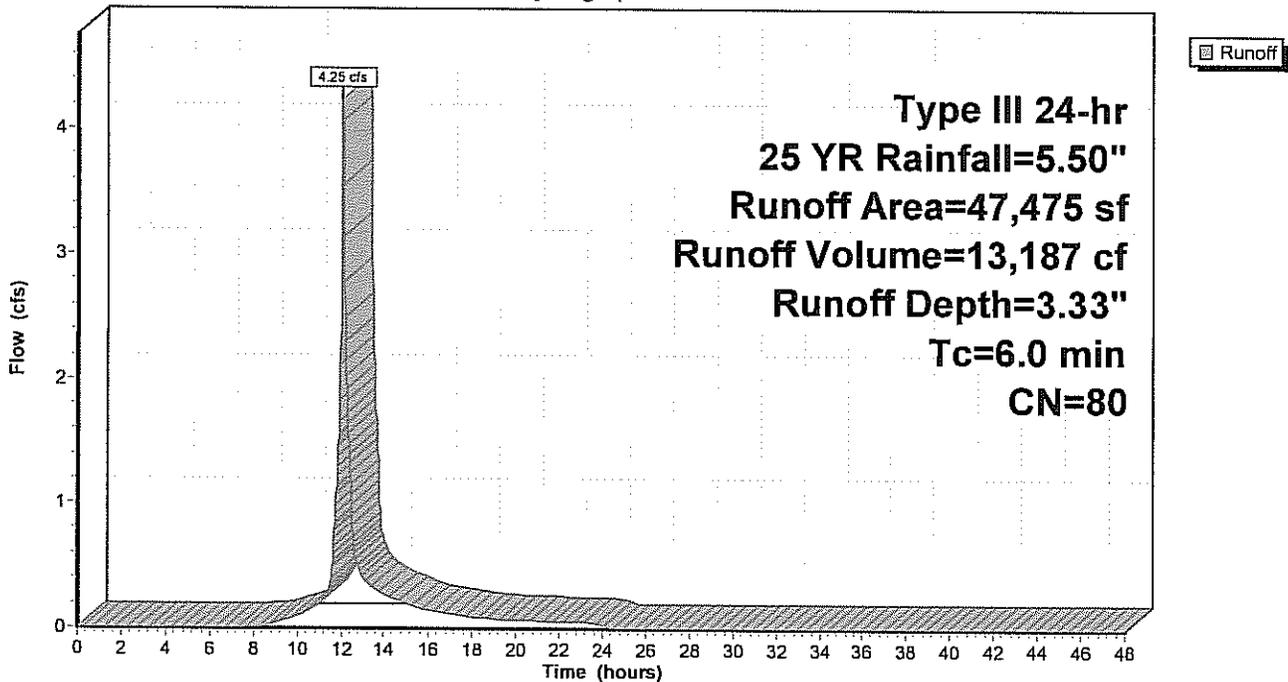
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.02 hrs  
 Type III 24-hr 25 YR Rainfall=5.50"

Area (sf)	CN	Description
14,950	98	Roofs, HSG C
1,689	98	Paved parking, HSG C
30,836	70	Woods, Good, HSG C
47,475	80	Weighted Average
30,836		64.95% Pervious Area
16,639		35.05% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					Direct Entry,

**Subcatchment POST 3A: Post Development Area 3A**

Hydrograph



**Summary for Subcatchment POST 4: Post Development Area 4**

Runoff = 9.98 cfs @ 12.08 hrs, Volume= 33,910 cf, Depth= 4.92"

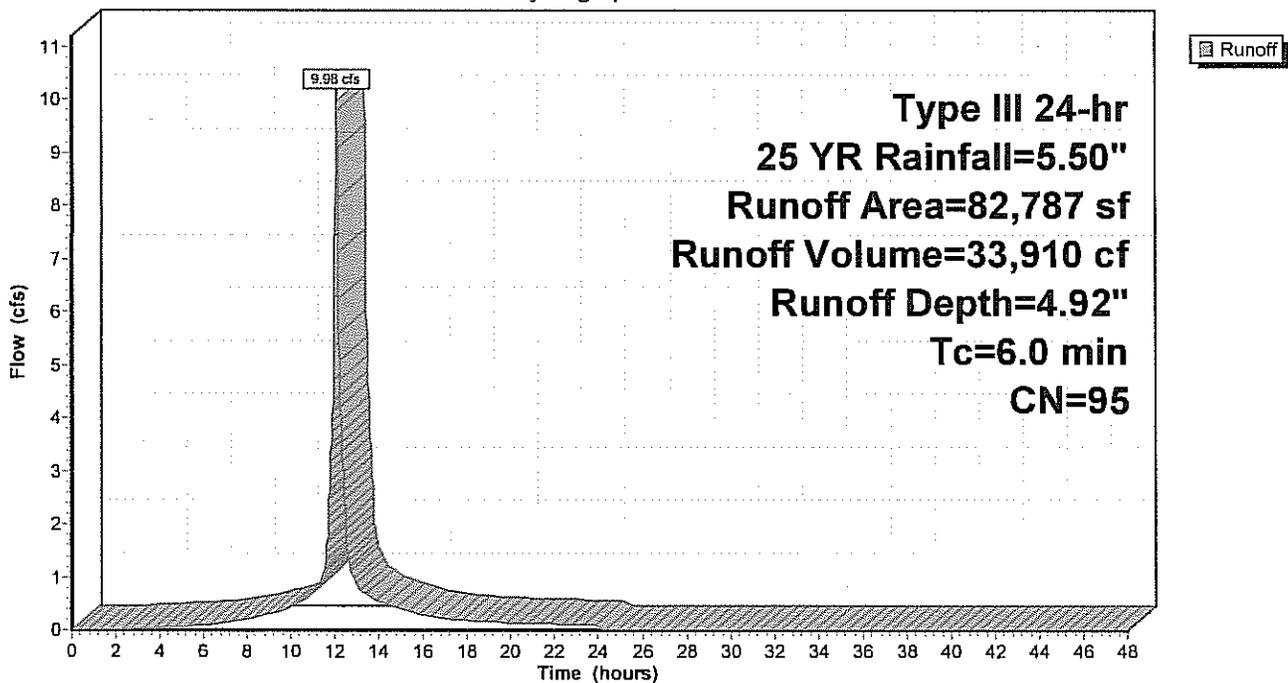
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.02 hrs  
 Type III 24-hr 25 YR Rainfall=5.50"

Area (sf)	CN	Description
70,785	98	Paved parking, HSG C
12,002	74	>75% Grass cover, Good, HSG C
82,787	95	Weighted Average
12,002		14.50% Pervious Area
70,785		85.50% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					Direct Entry,

**Subcatchment POST 4: Post Development Area 4**

Hydrograph



**Summary for Subcatchment POST 4A: Post Development Area 4A**

Runoff = 2.56 cfs @ 12.09 hrs, Volume= 7,984 cf, Depth= 2.68"

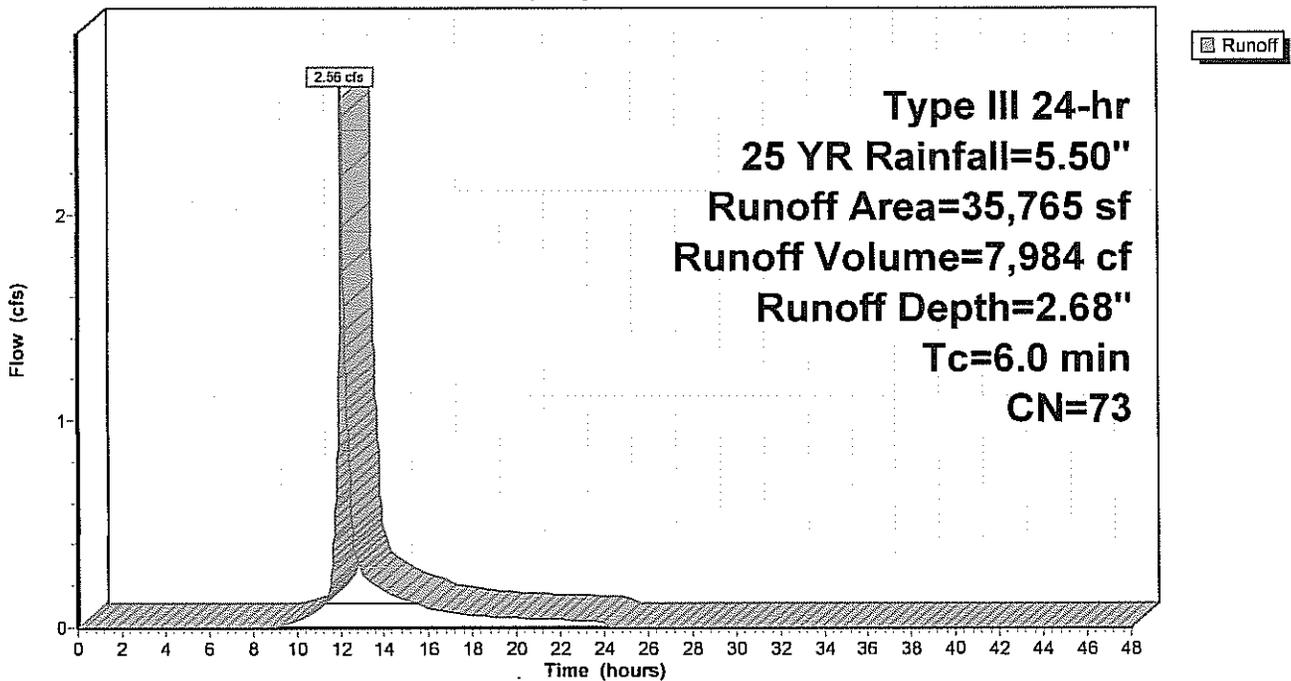
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.02 hrs  
 Type III 24-hr 25 YR Rainfall=5.50"

Area (sf)	CN	Description
32,116	70	Woods, Good, HSG C
3,649	98	Paved parking, HSG C
35,765	73	Weighted Average
32,116		89.80% Pervious Area
3,649		10.20% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					Direct Entry,

**Subcatchment POST 4A: Post Development Area 4A**

Hydrograph

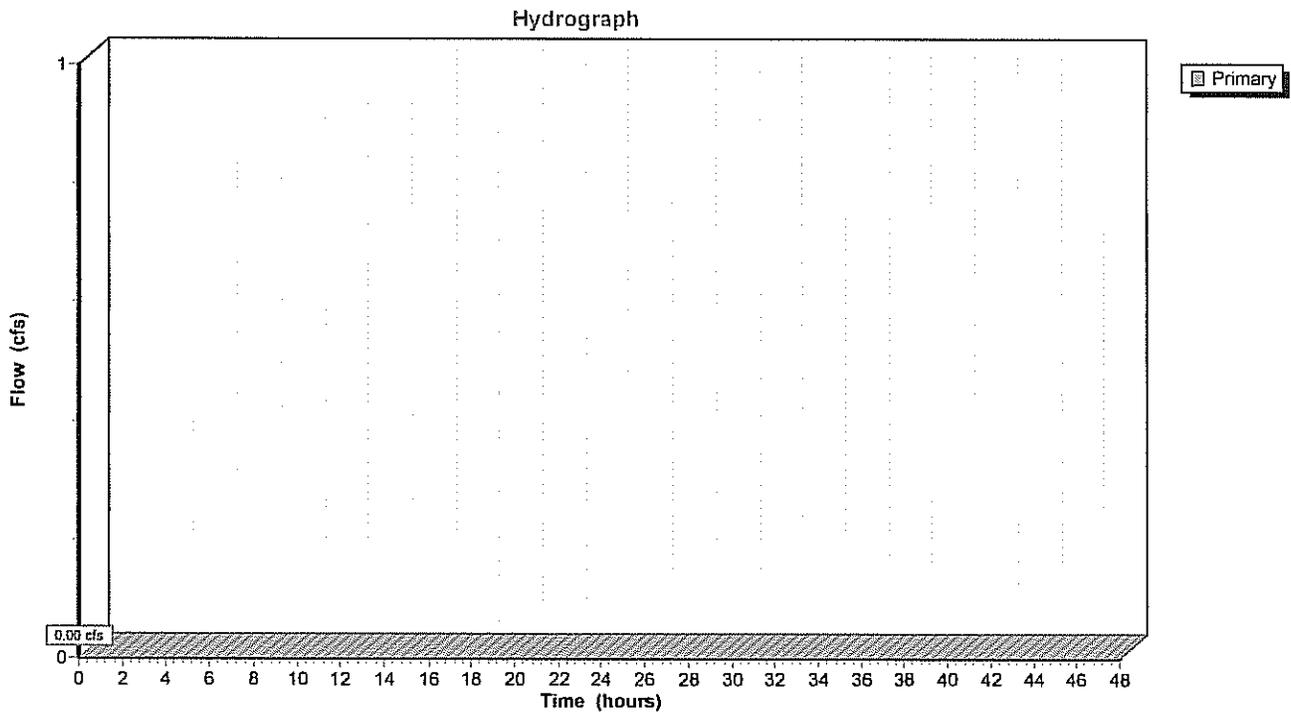


### Summary for Pond AP-1: WET-8 (No Flow)

[40] Hint: Not Described (Outflow=Inflow)

Primary OutFlow Max=0.00 cfs @ 0.00 hrs HW=0.00' TW=0.00' (Dynamic Tailwater)

### Pond AP-1: WET-8 (No Flow)



### Summary for Pond AP-2: WET-1

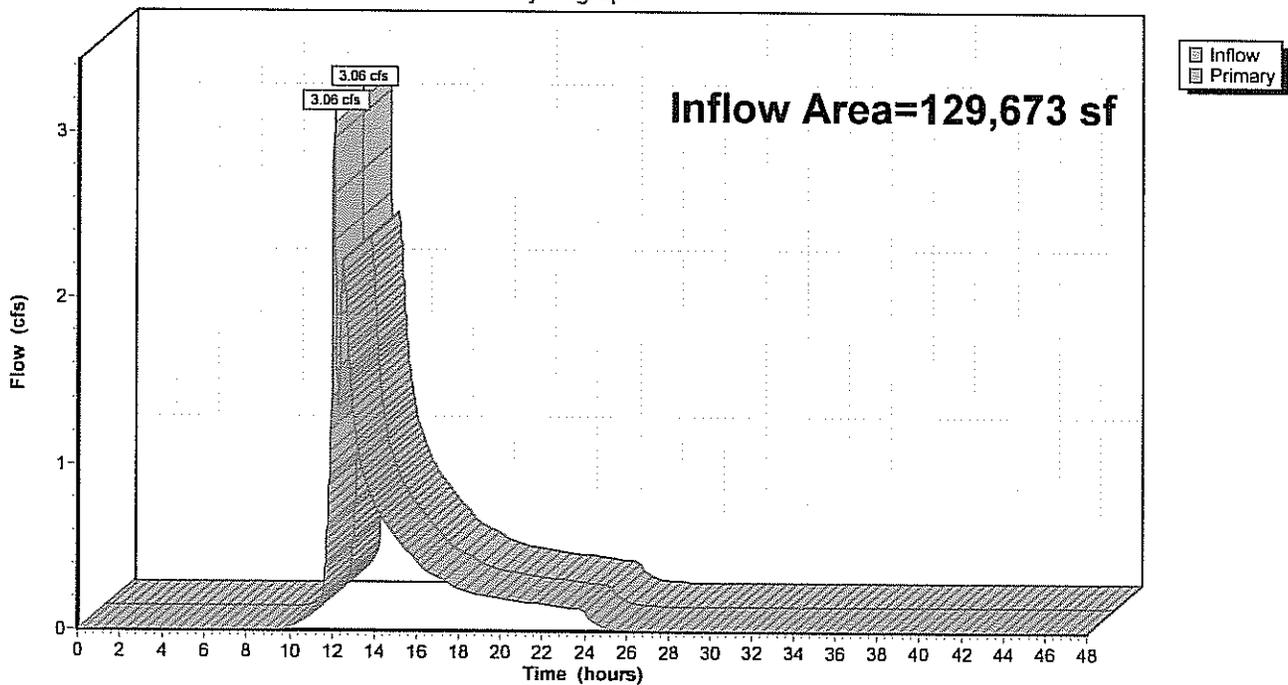
[40] Hint: Not Described (Outflow=Inflow)

Inflow Area = 129,673 sf, 2.72% Impervious, Inflow Depth = 2.09" for 25 YR event  
Inflow = 3.06 cfs @ 12.09 hrs, Volume= 22,620 cf  
Primary = 3.06 cfs @ 12.09 hrs, Volume= 22,620 cf, Atten= 0%, Lag= 0.0 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.02 hrs

### Pond AP-2: WET-1

Hydrograph



### Summary for Pond AP-3: Offsite-18"CMP

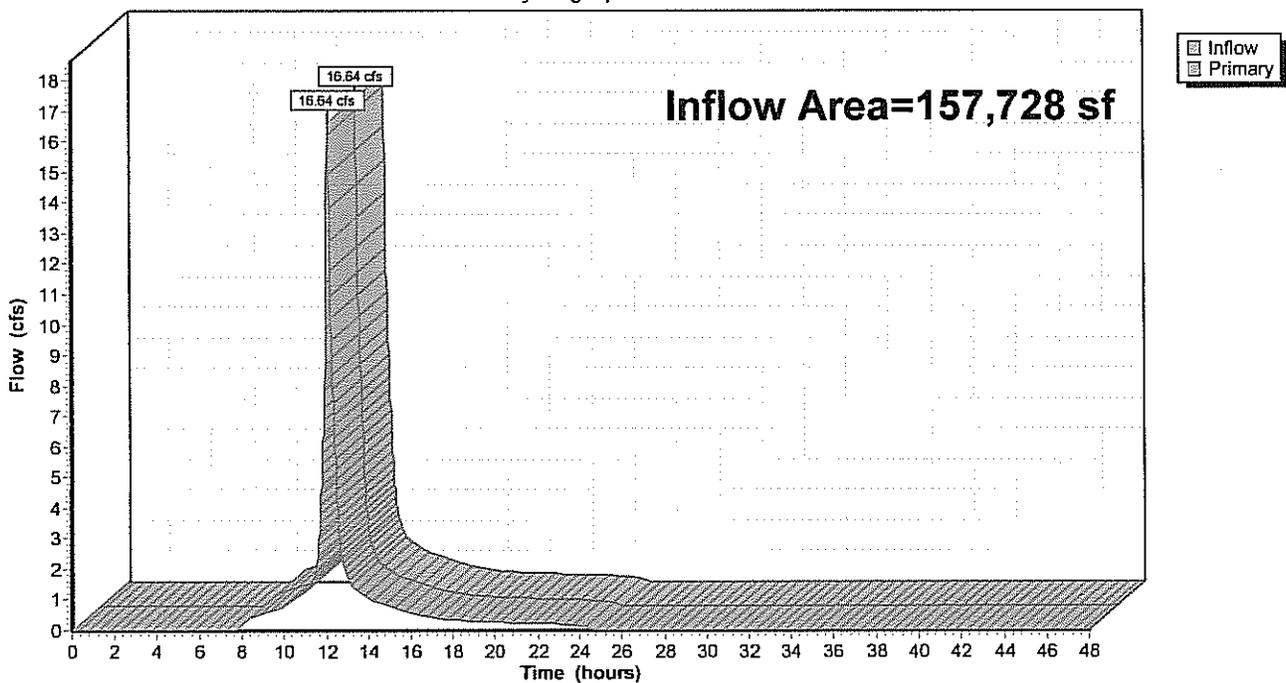
[40] Hint: Not Described (Outflow=Inflow)

Inflow Area = 157,728 sf, 86.51% Impervious, Inflow Depth = 4.68" for 25 YR event  
Inflow = 16.64 cfs @ 12.13 hrs, Volume= 61,493 cf  
Primary = 16.64 cfs @ 12.13 hrs, Volume= 61,493 cf, Atten= 0%, Lag= 0.0 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.02 hrs

### Pond AP-3: Offsite-18"CMP

Hydrograph



### Summary for Pond AP-4: WET-2

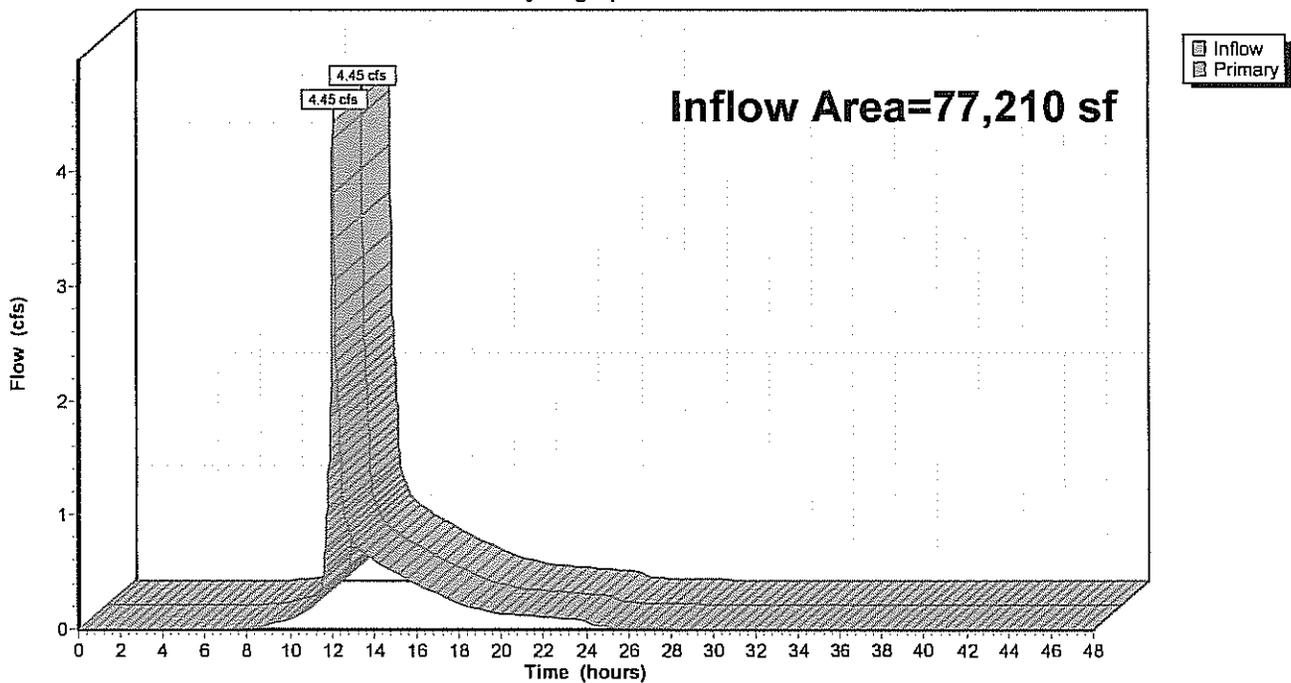
[40] Hint: Not Described (Outflow=Inflow)

Inflow Area = 77,210 sf, 45.86% Impervious, Inflow Depth > 3.29" for 25 YR event  
Inflow = 4.45 cfs @ 12.09 hrs, Volume= 21,186 cf  
Primary = 4.45 cfs @ 12.09 hrs, Volume= 21,186 cf, Atten= 0%, Lag= 0.0 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.02 hrs

### Pond AP-4: WET-2

Hydrograph



### Summary for Pond AP-5: WET-3

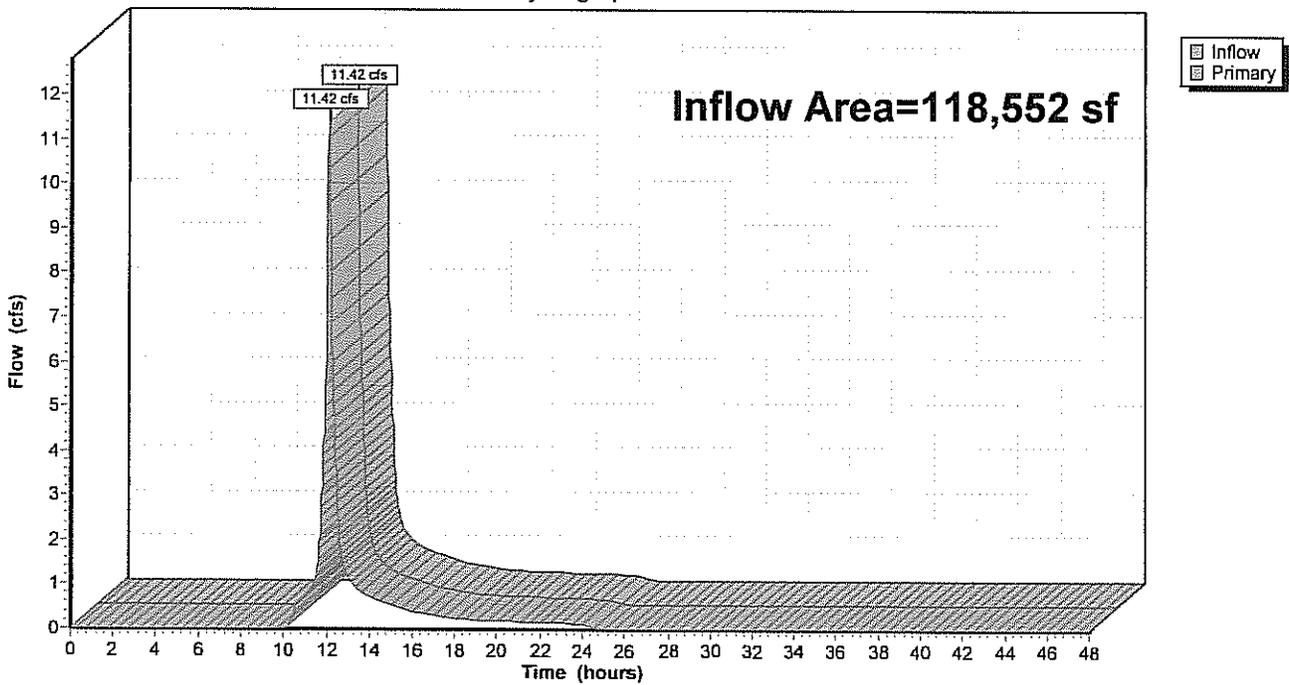
[40] Hint: Not Described (Outflow=Inflow)

Inflow Area = 118,552 sf, 62.79% Impervious, Inflow Depth = 3.78" for 25 YR event  
Inflow = 11.42 cfs @ 12.12 hrs, Volume= 37,387 cf  
Primary = 11.42 cfs @ 12.12 hrs, Volume= 37,387 cf, Atten= 0%, Lag= 0.0 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.02 hrs

### Pond AP-5: WET-3

Hydrograph



**Summary for Pond BASIN-1: BioRetention Area 1**

Inflow Area = 81,936 sf, 4.31% Impervious, Inflow Depth = 3.32" for 25 YR event  
 Inflow = 7.88 cfs @ 12.11 hrs, Volume= 22,668 cf  
 Outflow = 1.61 cfs @ 12.58 hrs, Volume= 13,016 cf, Atten= 80%, Lag= 28.0 min  
 Primary = 1.61 cfs @ 12.58 hrs, Volume= 13,016 cf

Routing by Dyn-Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.02 hrs  
 Peak Elev= 78.39' @ 12.58 hrs Surf.Area= 5,699 sf Storage= 11,010 cf  
 Flood Elev= 80.00' Surf.Area= 7,310 sf Storage= 21,444 cf

Plug-Flow detention time= 216.9 min calculated for 13,016 cf (57% of inflow)  
 Center-of-Mass det. time= 108.7 min ( 947.8 - 839.1 )

Volume	Invert	Avail.Storage	Storage Description
#1	76.00'	21,444 cf	<b>Custom Stage Data (Prismatic)</b> Listed below (Recalc)

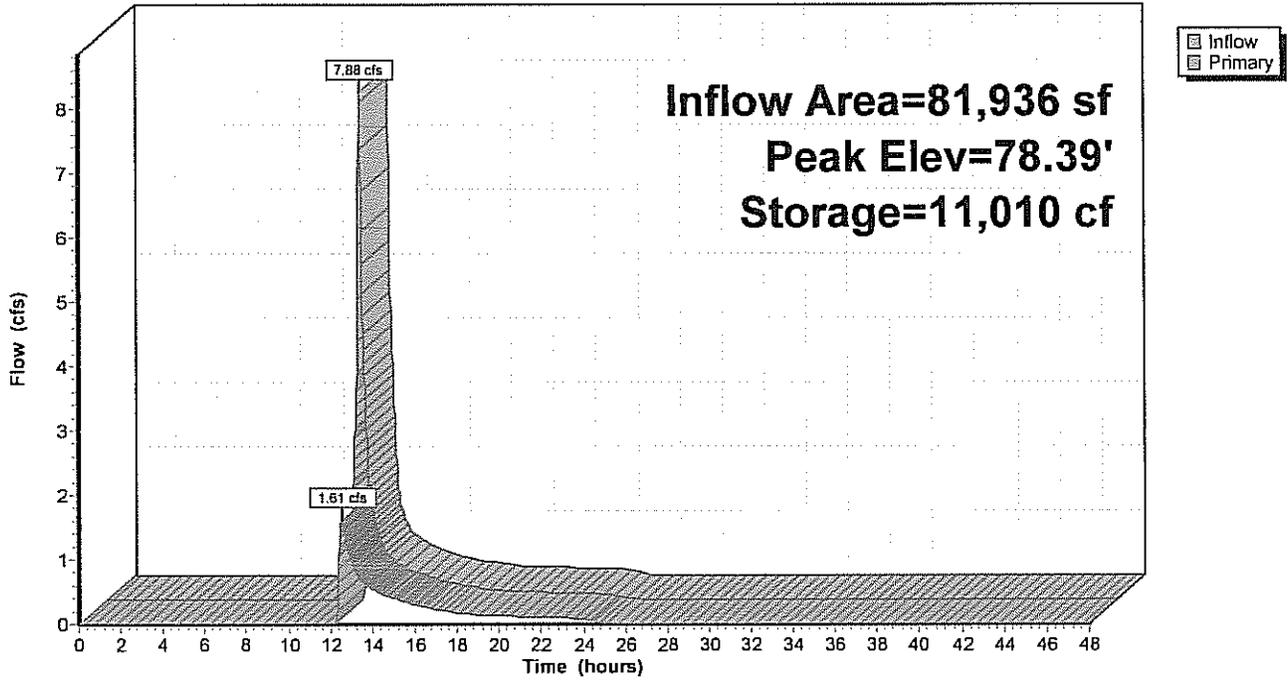
Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
76.00	3,553	0	0
77.00	4,407	3,980	3,980
78.00	5,319	4,863	8,843
79.00	6,286	5,803	14,646
80.00	7,310	6,798	21,444

Device	Routing	Invert	Outlet Devices
#1	Primary	78.15'	<b>5.0' long x 25.0' breadth Broad-Crested Rectangular Weir</b> Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 Coef. (English) 2.68 2.70 2.70 2.64 2.63 2.64 2.64 2.63

Primary OutFlow Max=1.61 cfs @ 12.58 hrs HW=78.39' TW=0.00' (Dynamic Tailwater)  
 ↑1=Broad-Crested Rectangular Weir (Weir Controls 1.61 cfs @ 1.32 fps)

### Pond BASIN-1: BioRetention Area 1

Hydrograph



**Summary for Pond BASIN-2: BioRetention Area 2**

Inflow Area = 157,728 sf, 86.51% Impervious, Inflow Depth = 4.92" for 25 YR event  
 Inflow = 19.02 cfs @ 12.08 hrs, Volume= 64,605 cf  
 Outflow = 16.64 cfs @ 12.13 hrs, Volume= 61,493 cf, Atten= 13%, Lag= 2.7 min  
 Primary = 16.64 cfs @ 12.13 hrs, Volume= 61,493 cf

Routing by Dyn-Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.02 hrs  
 Peak Elev= 77.47' @ 12.13 hrs Surf.Area= 4,098 sf Storage= 7,677 cf  
 Flood Elev= 78.00' Surf.Area= 4,425 sf Storage= 9,083 cf

Plug-Flow detention time= 56.8 min calculated for 61,467 cf (95% of inflow)  
 Center-of-Mass det. time= 29.2 min ( 795.0 - 765.8 )

Volume	Invert	Avail.Storage	Storage Description
#1	74.50'	9,083 cf	Custom Stage Data (Prismatic) Listed below (Recalc)
Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
74.50	0	0	0
75.00	1,805	451	451
76.00	2,690	2,248	2,699
77.00	3,632	3,161	5,860
77.80	4,425	3,223	9,083

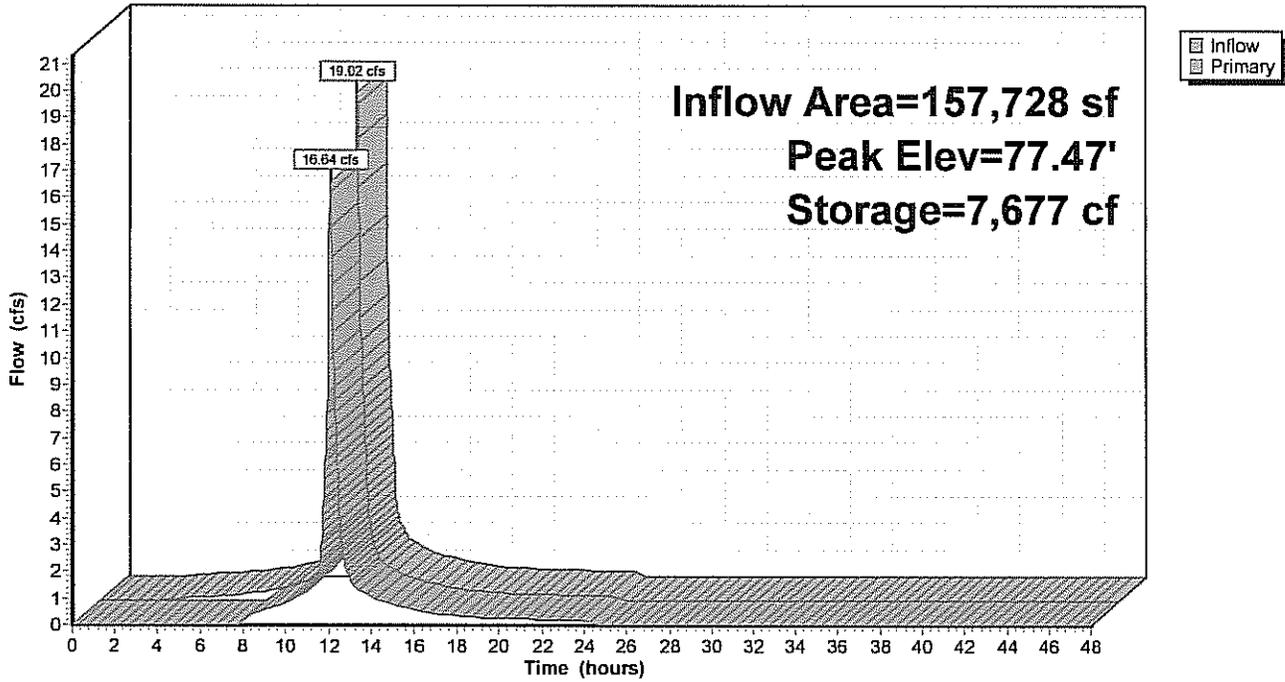
Device	Routing	Invert	Outlet Devices
#1	Primary	76.15'	<b>4.0' long x 2.0' breadth Broad-Crested Rectangular Weir</b> Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 3.00 3.50 Coef. (English) 2.54 2.61 2.61 2.60 2.66 2.70 2.77 2.89 2.88 2.85 3.07 3.20 3.32

Primary OutFlow Max=16.56 cfs @ 12.13 hrs HW=77.47' TW=0.00' (Dynamic Tailwater)

↑1=Broad-Crested Rectangular Weir (Weir Controls 16.56 cfs @ 3.14 fps)

### Pond BASIN-2: BioRetention Area 2

Hydrograph



**Summary for Pond BASIN-3: BioRetention Area 3**

Inflow Area = 29,735 sf, 63.13% Impervious, Inflow Depth = 3.87" for 25 YR event  
 Inflow = 3.23 cfs @ 12.10 hrs, Volume= 9,598 cf  
 Outflow = 0.38 cfs @ 12.77 hrs, Volume= 7,999 cf, Atten= 88%, Lag= 40.1 min  
 Primary = 0.38 cfs @ 12.77 hrs, Volume= 7,999 cf

Routing by Dyn-Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.02 hrs  
 Peak Elev= 76.46' @ 12.77 hrs Surf.Area= 3,969 sf Storage= 5,042 cf  
 Flood Elev= 78.00' Surf.Area= 5,167 sf Storage= 12,044 cf

Plug-Flow detention time= 232.5 min calculated for 7,999 cf (83% of inflow)  
 Center-of-Mass det. time= 165.4 min ( 984.1 - 818.7 )

Volume	Invert	Avail.Storage	Storage Description
#1	75.00'	12,044 cf	Custom Stage Data (Prismatic) Listed below (Recalc)
Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
75.00	2,938	0	0
76.00	3,624	3,281	3,281
77.00	4,367	3,996	7,277
78.00	5,167	4,767	12,044

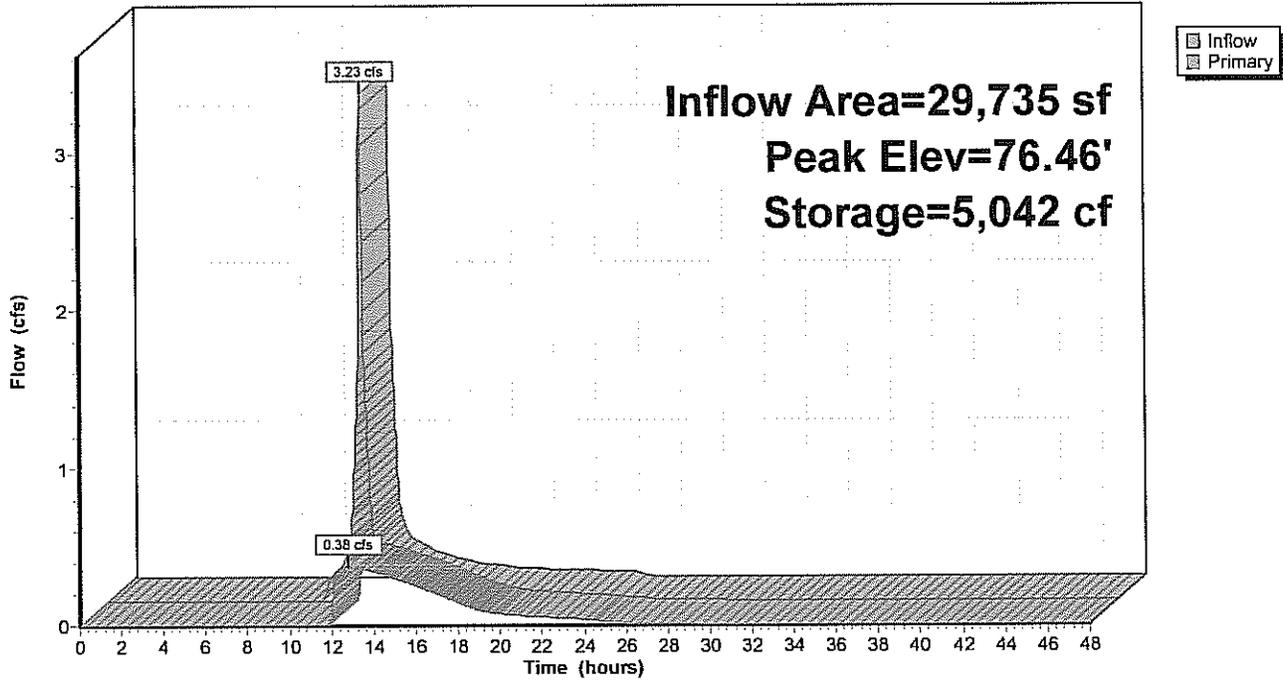
Device	Routing	Invert	Outlet Devices
#1	Primary	75.00'	<b>12.0" Round 12" HDPE</b> L= 30.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 75.00' / 74.80' S= 0.0067 ' S= 0.0067 ' Cc= 0.900 n= 0.011 Concrete pipe, straight & clean, Flow Area= 0.79 sf
#2	Device 1	75.50'	<b>4.0" Vert. 4" Orifice</b> C= 0.600
#3	Device 1	76.50'	<b>4.0' long x 1.50' rise Sharp-Crested Rectangular Weir</b> 2 End Contraction(s) 1.5' Crest Height

Primary OutFlow Max=0.38 cfs @ 12.77 hrs HW=76.46' TW=0.00' (Dynamic Tailwater)

- ↑ 1=12" HDPE (Passes 0.38 cfs of 3.48 cfs potential flow)
- ↑ 2=4" Orifice (Orifice Controls 0.38 cfs @ 4.30 fps)
- ↑ 3=Sharp-Crested Rectangular Weir ( Controls 0.00 cfs)

### Pond BASIN-3: BioRetention Area 3

Hydrograph



**Summary for Pond BASIN-4: BioRetention Area 4**

Inflow Area = 82,787 sf, 85.50% Impervious, Inflow Depth = 4.73" for 25 YR event  
 Inflow = 9.71 cfs @ 12.09 hrs, Volume= 32,636 cf  
 Outflow = 9.00 cfs @ 12.12 hrs, Volume= 29,403 cf, Atten= 7%, Lag= 2.1 min  
 Primary = 9.00 cfs @ 12.12 hrs, Volume= 29,403 cf

Routing by Dyn-Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.02 hrs  
 Peak Elev= 78.49' @ 12.12 hrs Surf.Area= 3,978 sf Storage= 5,093 cf  
 Flood Elev= 79.00' Surf.Area= 4,374 sf Storage= 7,218 cf

Plug-Flow detention time= 80.8 min calculated for 29,391 cf (90% of inflow)  
 Center-of-Mass det. time= 33.2 min ( 816.7 - 783.5 )

Volume	Invert	Avail.Storage	Storage Description
#1	77.00'	7,218 cf	<b>Custom Stage Data (Prismatic)</b> Listed below (Recalc)

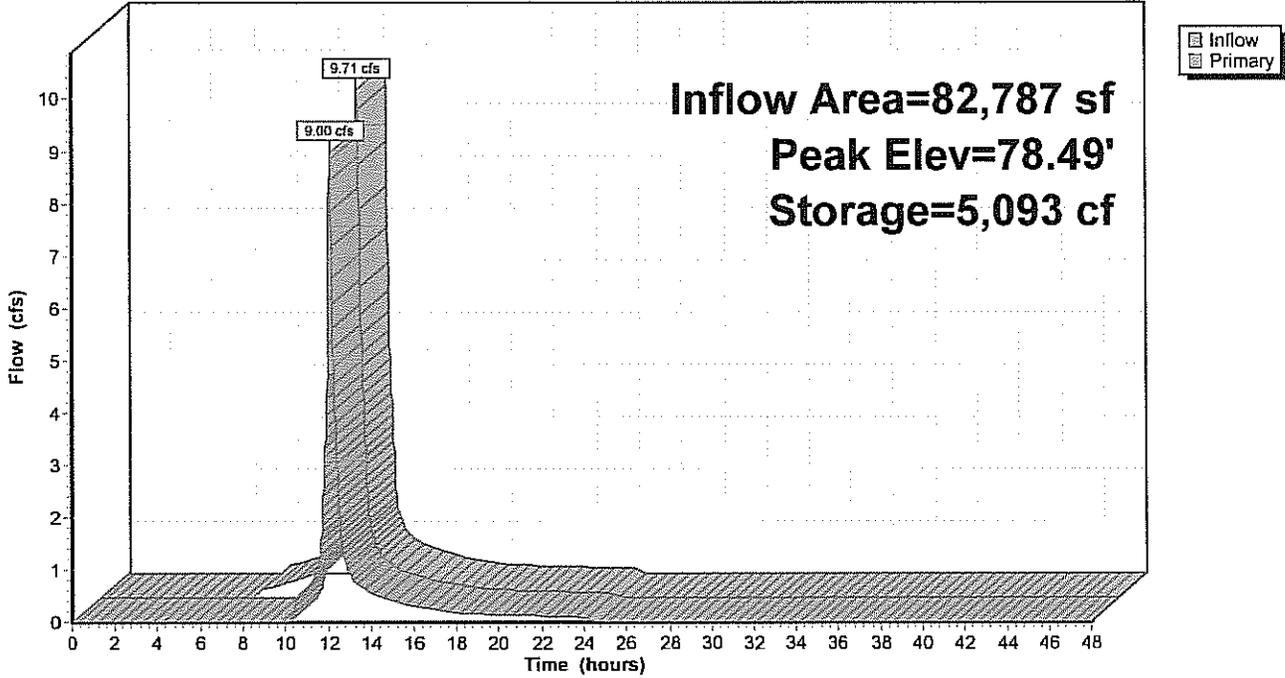
Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
77.00	2,871	0	0
78.00	3,595	3,233	3,233
79.00	4,374	3,985	7,218

Device	Routing	Invert	Outlet Devices
#1	Primary	78.00'	<b>10.0' long x 8.0' breadth Broad-Crested Rectangular Weir</b> Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 3.00 3.50 4.00 4.50 5.00 5.50 Coef. (English) 2.43 2.54 2.70 2.69 2.68 2.68 2.66 2.64 2.64 2.64 2.65 2.65 2.66 2.66 2.68 2.70 2.74

Primary OutFlow Max=8.97 cfs @ 12.12 hrs HW=78.49' TW=0.00' (Dynamic Tailwater)  
 ↑1=Broad-Crested Rectangular Weir (Weir Controls 8.97 cfs @ 1.83 fps)

**Pond BASIN-4: BioRetention Area 4**

Hydrograph



**Summary for Pond FB-1: Forebay**

Inflow Area = 81,936 sf, 4.31% Impervious, Inflow Depth = 3.83" for 25 YR event  
 Inflow = 8.32 cfs @ 12.09 hrs, Volume= 26,171 cf  
 Outflow = 7.88 cfs @ 12.11 hrs, Volume= 22,668 cf, Atten= 5%, Lag= 1.7 min  
 Primary = 7.88 cfs @ 12.11 hrs, Volume= 22,668 cf

Routing by Dyn-Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.02 hrs  
 Peak Elev= 78.86' @ 12.11 hrs Surf.Area= 2,879 sf Storage= 4,734 cf  
 Flood Elev= 79.00' Surf.Area= 2,991 sf Storage= 5,158 cf

Plug-Flow detention time= 94.8 min calculated for 22,668 cf (87% of inflow)  
 Center-of-Mass det. time= 35.2 min ( 839.1 - 803.9 )

Volume	Invert	Avail.Storage	Storage Description
#1	76.50'	5,158 cf	Custom Stage Data (Prismatic) Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
76.50	1,200	0	0
77.00	1,518	680	680
78.00	2,227	1,873	2,552
78.50	2,602	1,207	3,759
79.00	2,991	1,398	5,158

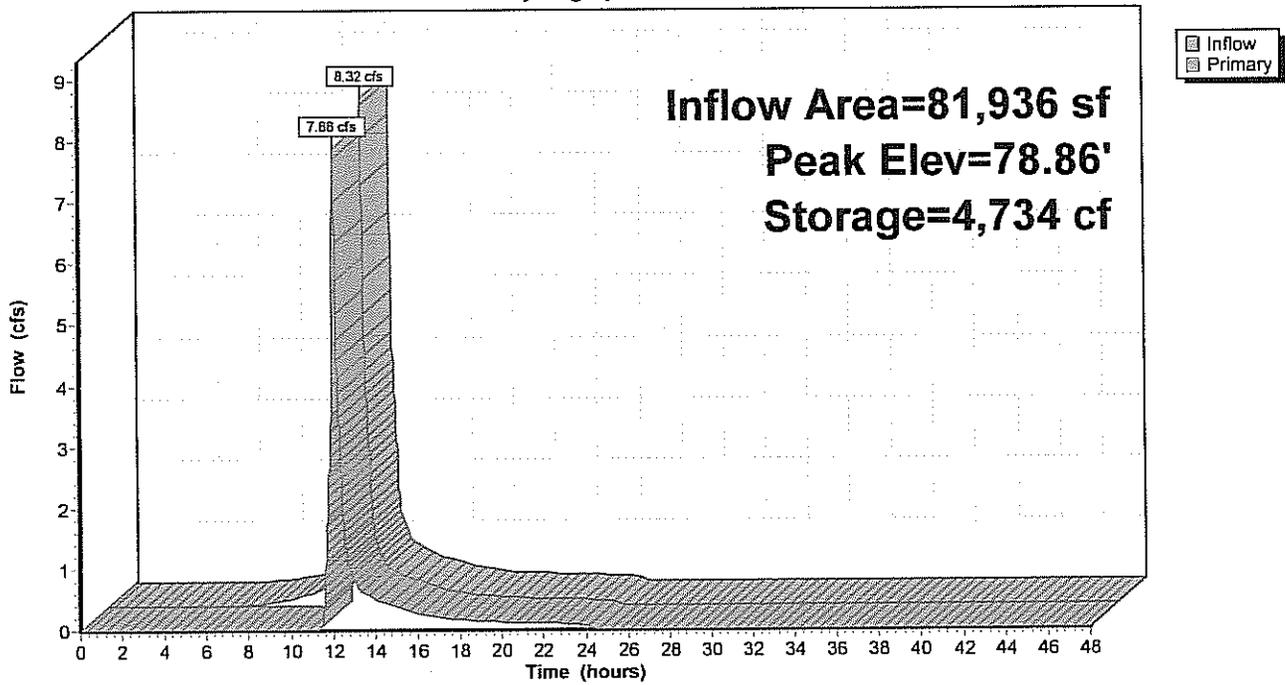
Device	Routing	Invert	Outlet Devices
#1	Primary	78.40'	<b>10.0' long x 6.0' breadth Broad-Crested Rectangular Weir</b> Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 3.00 3.50 4.00 4.50 5.00 5.50 Coef. (English) 2.37 2.51 2.70 2.68 2.68 2.67 2.65 2.65 2.65 2.65 2.66 2.66 2.67 2.69 2.72 2.76 2.83

Primary OutFlow Max=7.84 cfs @ 12.11 hrs HW=78.85' TW=77.31' (Dynamic Tailwater)

↑1=Broad-Crested Rectangular Weir (Weir Controls 7.84 cfs @ 1.73 fps)

### Pond FB-1: Forebay

Hydrograph



**Summary for Pond FB-2: Forebay**

Inflow Area = 29,735 sf, 63.13% Impervious, Inflow Depth = 4.25" for 25 YR event  
 Inflow = 3.28 cfs @ 12.09 hrs, Volume= 10,537 cf  
 Outflow = 3.23 cfs @ 12.10 hrs, Volume= 9,598 cf, Atten= 1%, Lag= 0.8 min  
 Primary = 3.23 cfs @ 12.10 hrs, Volume= 9,598 cf

Routing by Dyn-Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.02 hrs  
 Peak Elev= 76.86' @ 12.10 hrs Surf.Area= 935 sf Storage= 1,173 cf  
 Flood Elev= 77.00' Surf.Area= 982 sf Storage= 1,304 cf

Plug-Flow detention time= 72.3 min calculated for 9,598 cf (91% of inflow)  
 Center-of-Mass det. time= 27.6 min ( 818.7 - 791.1 )

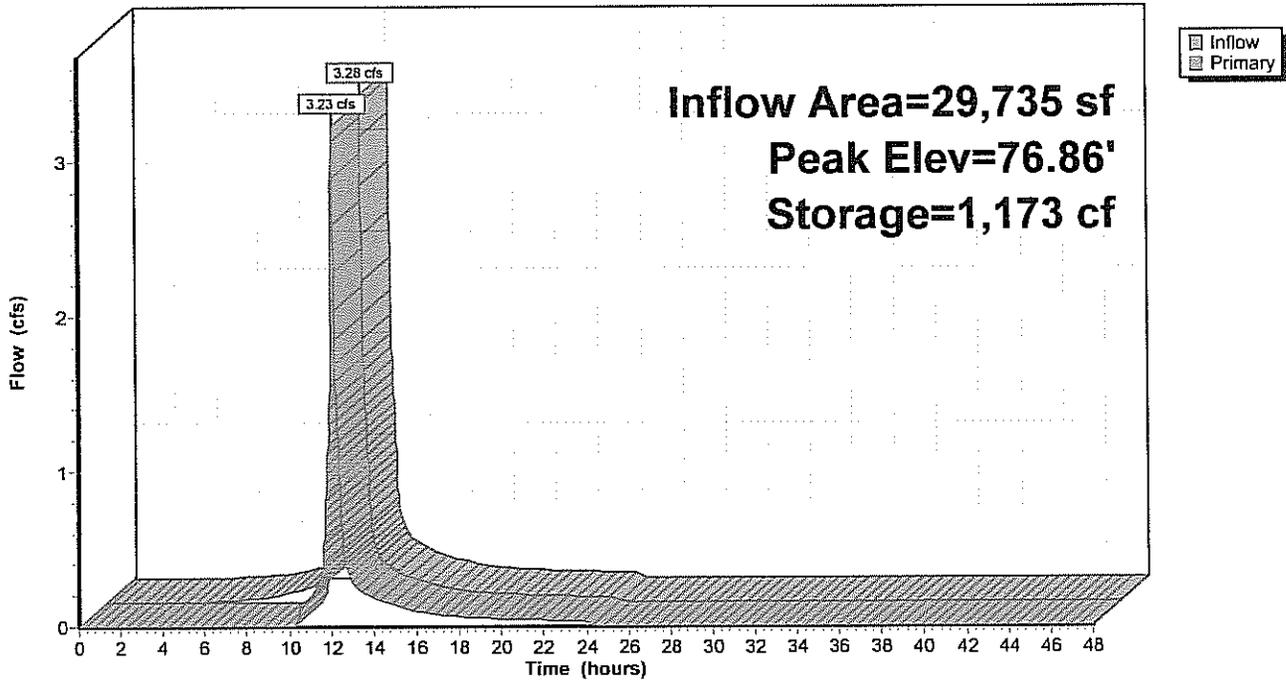
Volume	Invert	Avail.Storage	Storage Description
#1	75.00'	1,304 cf	<b>Custom Stage Data (Prismatic) Listed below (Recalc)</b>
Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
75.00	350	0	0
76.00	638	494	494
77.00	982	810	1,304

Device	Routing	Invert	Outlet Devices
#1	Primary	76.60'	<b>10.0' long x 5.0' breadth Broad-Crested Rectangular Weir</b> Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 3.00 3.50 4.00 4.50 5.00 5.50 Coef. (English) 2.34 2.50 2.70 2.68 2.68 2.66 2.65 2.65 2.65 2.65 2.67 2.66 2.68 2.70 2.74 2.79 2.88

**Primary OutFlow** Max=3.23 cfs @ 12.10 hrs HW=76.86' TW=75.93' (Dynamic Tailwater)  
 ↳1=Broad-Crested Rectangular Weir (Weir Controls 3.23 cfs @ 1.23 fps)

### Pond FB-2: Forebay

Hydrograph



**Summary for Pond FB-3: Forebay**

Inflow Area = 82,787 sf, 85.50% Impervious, Inflow Depth = 4.92" for 25 YR event  
 Inflow = 9.98 cfs @ 12.08 hrs, Volume= 33,910 cf  
 Outflow = 9.71 cfs @ 12.09 hrs, Volume= 32,636 cf, Atten= 3%, Lag= 0.3 min  
 Primary = 9.71 cfs @ 12.09 hrs, Volume= 32,636 cf

Routing by Dyn-Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.02 hrs  
 Peak Elev= 78.55' @ 12.12 hrs Surf.Area= 1,336 sf Storage= 1,598 cf  
 Flood Elev= 78.80' Surf.Area= 1,439 sf Storage= 1,941 cf

Plug-Flow detention time= 40.1 min calculated for 32,622 cf (96% of inflow)  
 Center-of-Mass det. time= 17.7 min ( 783.5 - 765.8 )

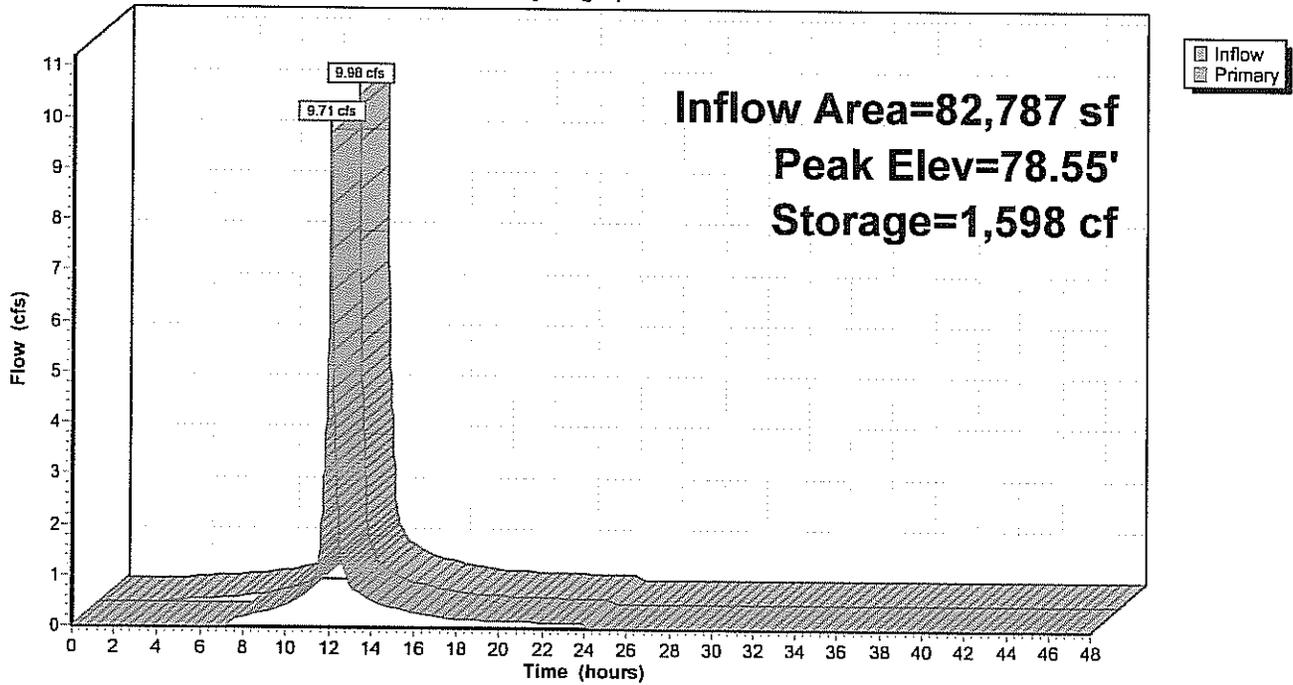
Volume	Invert	Avail.Storage	Storage Description
#1	77.00'	1,941 cf	Custom Stage Data (Prismatic) Listed below (Recalc)
Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
77.00	743	0	0
78.00	1,104	924	924
78.80	1,439	1,017	1,941

Device	Routing	Invert	Outlet Devices
#1	Primary	78.30'	<b>38.0' long x 1.0' breadth Broad-Crested Rectangular Weir</b> Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 3.00 Coef. (English) 2.69 2.72 2.75 2.85 2.98 3.08 3.20 3.28 3.31 3.30 3.31 3.32

Primary OutFlow Max=8.62 cfs @ 12.09 hrs HW=78.54' TW=78.47' (Dynamic Tailwater)  
 ↑1=Broad-Crested Rectangular Weir (Weir Controls 8.62 cfs @ 0.94 fps)

### Pond FB-3: Forebay

Hydrograph



**1998-POST-WS**

Type III 24-hr 100 YR Rainfall=7.00"

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Time span=0.00-48.00 hrs, dt=0.02 hrs, 2401 points  
 Runoff by SCS TR-20 method, UH=SCS, Weighted-CN  
 Reach routing by Dyn-Stor-Ind method - Pond routing by Dyn-Stor-Ind method

**Subcatchment POST 1: Post Development** Runoff Area=81,936 sf 4.31% Impervious Runoff Depth=5.25"  
 Tc=6.0 min CN=85 Runoff=11.25 cfs 35,865 cf

**Subcatchment POST 1A: Post Development** Runoff Area=47,737 sf 0.00% Impervious Runoff Depth=3.62"  
 Tc=6.0 min CN=70 Runoff=4.64 cfs 14,394 cf

**Subcatchment POST 2: Post** Runoff Area=157,728 sf 86.51% Impervious Runoff Depth=6.41"  
 Tc=6.0 min CN=95 Runoff=24.45 cfs 84,197 cf

**Subcatchment POST 3: Post Development** Runoff Area=29,735 sf 63.13% Impervious Runoff Depth=5.71"  
 Tc=6.0 min CN=89 Runoff=4.33 cfs 14,144 cf

**Subcatchment POST 3A: Post** Runoff Area=47,475 sf 35.05% Impervious Runoff Depth=4.69"  
 Tc=6.0 min CN=80 Runoff=5.93 cfs 18,572 cf

**Subcatchment POST 4: Post Development** Runoff Area=82,787 sf 85.50% Impervious Runoff Depth=6.41"  
 Tc=6.0 min CN=95 Runoff=12.83 cfs 44,193 cf

**Subcatchment POST 4A: Post** Runoff Area=35,765 sf 10.20% Impervious Runoff Depth=3.94"  
 Tc=6.0 min CN=73 Runoff=3.78 cfs 11,729 cf

**Pond AP-1: WET-8 (No Flow)**

Primary=0.00 cfs 0 cf

**Pond AP-2: WET-1**

Inflow=6.92 cfs 37,104 cf  
 Primary=6.92 cfs 37,104 cf

**Pond AP-3: Offsite-18" CMP**

Inflow=21.81 cfs 81,084 cf  
 Primary=21.81 cfs 81,084 cf

**Pond AP-4: WET-2**

Inflow=6.26 cfs 30,178 cf  
 Primary=6.26 cfs 30,178 cf

**Pond AP-5: WET-3**

Inflow=15.24 cfs 51,415 cf  
 Primary=15.24 cfs 51,415 cf

**Pond BASIN-1: BioRetention Area 1**

Peak Elev=78.65' Storage=12,505 cf Inflow=10.76 cfs 32,362 cf  
 Outflow=4.77 cfs 22,710 cf

**Pond BASIN-2: BioRetention Area 2**

Peak Elev=77.69' Storage=8,600 cf Inflow=24.45 cfs 84,197 cf  
 Outflow=21.81 cfs 81,084 cf

**Pond BASIN-3: BioRetention Area 3**

Peak Elev=76.69' Storage=5,970 cf Inflow=4.28 cfs 13,205 cf  
 Outflow=1.54 cfs 11,605 cf

**Pond BASIN-4: BioRetention Area 4**

Peak Elev=78.57' Storage=5,425 cf Inflow=12.44 cfs 42,919 cf  
 Outflow=11.65 cfs 39,686 cf

**1998-POST-WS**

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Type III 24-hr 100 YR Rainfall=7.00"

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**Pond FB-1: Forebay** Peak Elev=78.95' Storage=5,004 cf Inflow=11.25 cfs 35,865 cf  
Outflow=10.76 cfs 32,362 cf

**Pond FB-2: Forebay** Peak Elev=76.91' Storage=1,221 cf Inflow=4.33 cfs 14,144 cf  
Outflow=4.28 cfs 13,205 cf

**Pond FB-3: Forebay** Peak Elev=78.63' Storage=1,699 cf Inflow=12.83 cfs 44,193 cf  
Outflow=12.44 cfs 42,919 cf

**Total Runoff Area = 483,163 sf Runoff Volume = 223,094 cf Average Runoff Depth = 5.54"**  
**48.29% Pervious = 233,334 sf 51.71% Impervious = 249,829 sf**

**Summary for Subcatchment POST 1: Post Development Area 1**

Runoff = 11.25 cfs @ 12.09 hrs, Volume= 35,865 cf, Depth= 5.25"

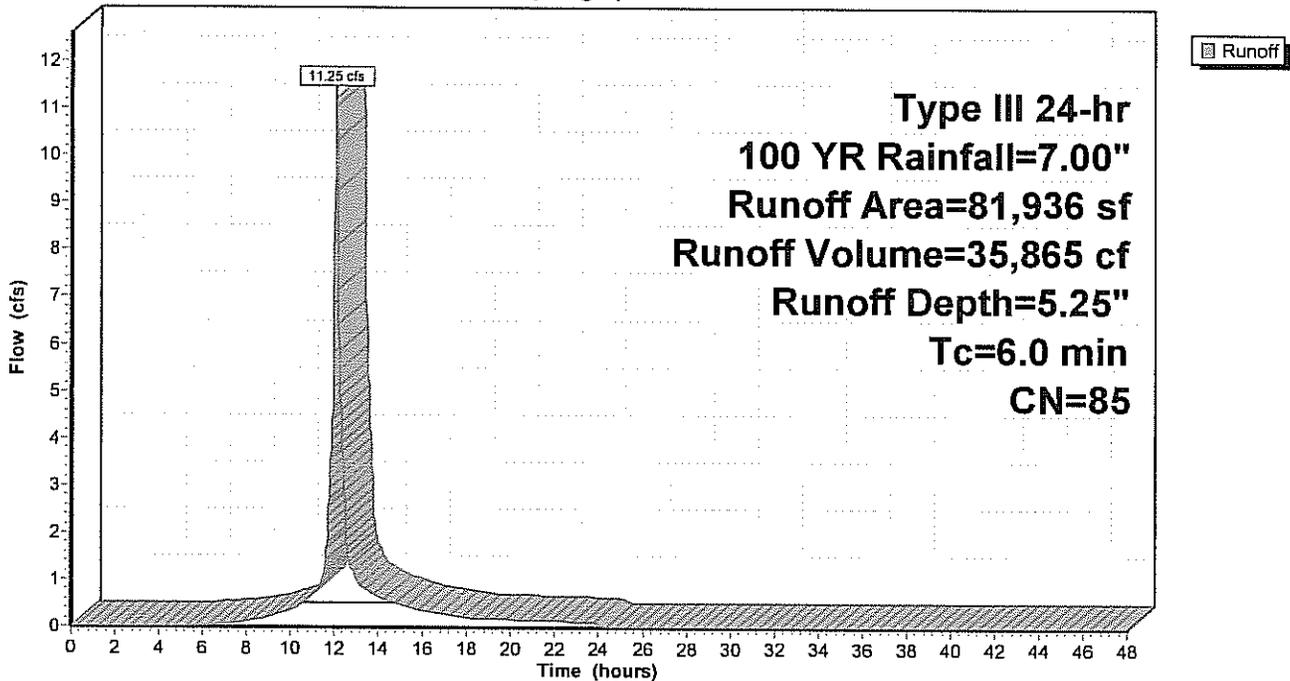
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.02 hrs  
 Type III 24-hr 100 YR Rainfall=7.00"

Area (sf)	CN	Description
51,749	89	Gravel roads, HSG C
3,528	98	Paved parking, HSG C
26,659	74	>75% Grass cover, Good, HSG C
81,936	85	Weighted Average
78,408		95.69% Pervious Area
3,528		4.31% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					Direct Entry,

**Subcatchment POST 1: Post Development Area 1**

Hydrograph



**Summary for Subcatchment POST 1A: Post Development Area 1A**

Runoff = 4.64 cfs @ 12.09 hrs, Volume= 14,394 cf, Depth= 3.62"

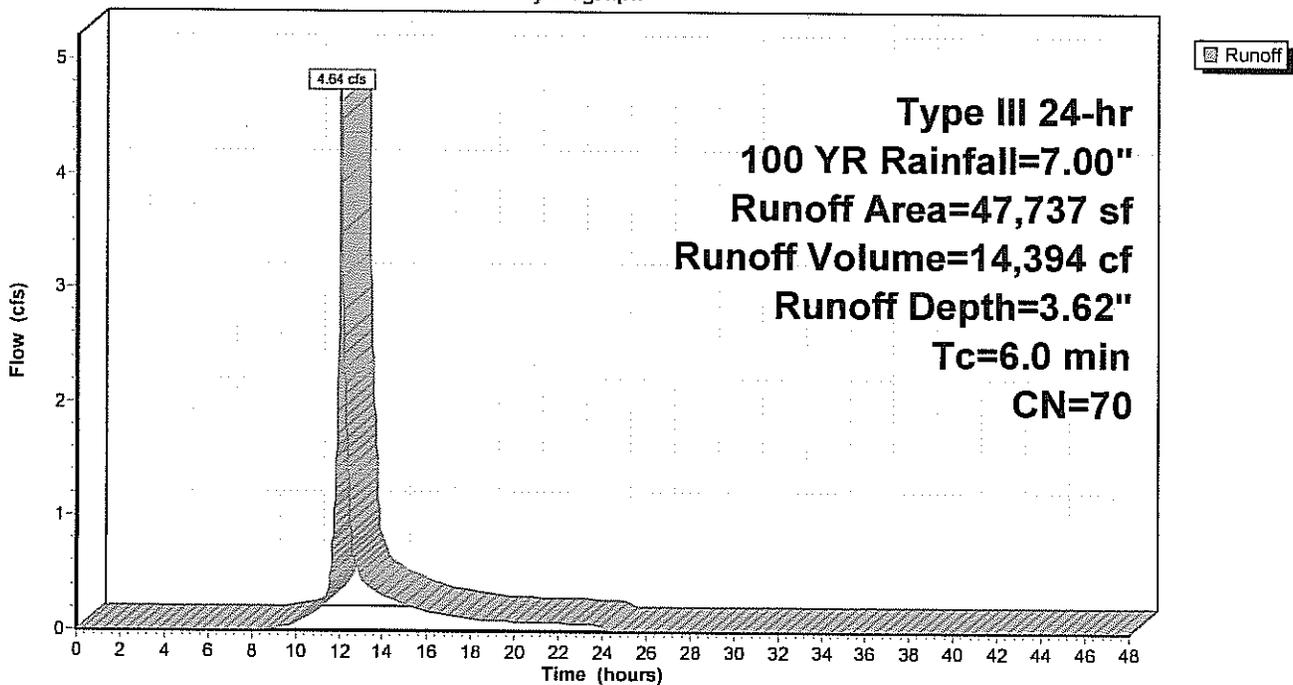
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.02 hrs  
 Type III 24-hr 100 YR Rainfall=7.00"

Area (sf)	CN	Description
942	89	Gravel roads, HSG C
46,795	70	Woods, Good, HSG C
47,737	70	Weighted Average
47,737		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					Direct Entry,

**Subcatchment POST 1A: Post Development Area 1A**

Hydrograph



**Summary for Subcatchment POST 2: Post Development Area 2**

Runoff = 24.45 cfs @ 12.08 hrs, Volume= 84,197 cf, Depth= 6.41"

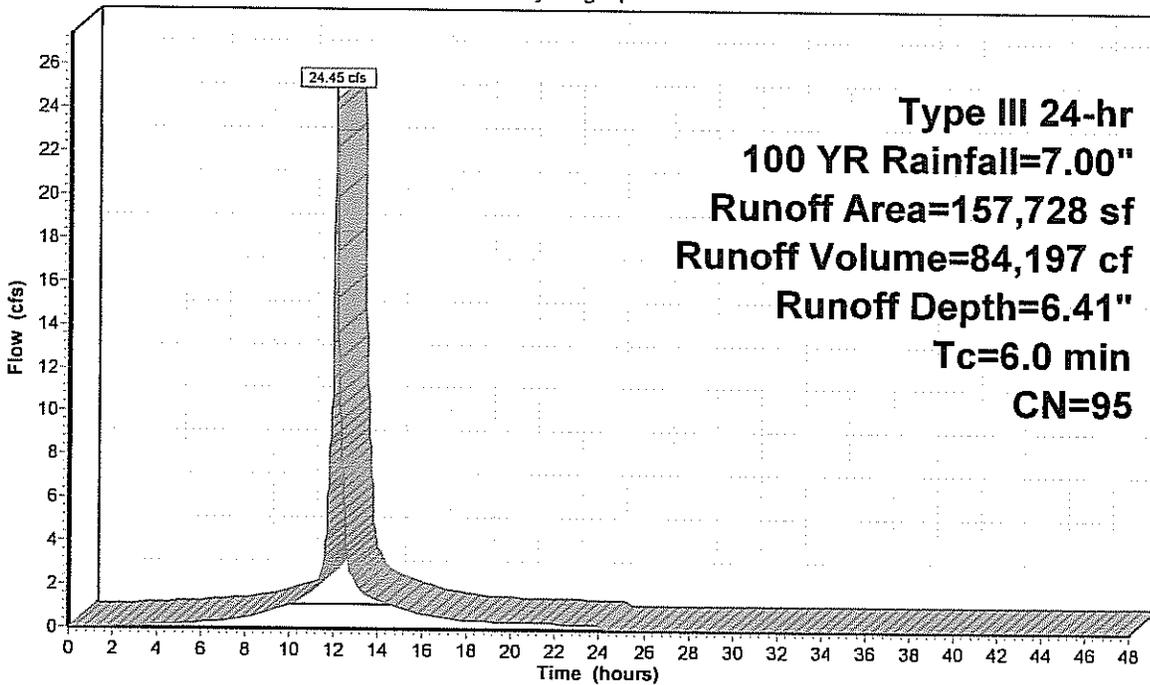
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.02 hrs  
 Type III 24-hr 100 YR Rainfall=7.00"

Area (sf)	CN	Description
3,154	89	Gravel roads, HSG C
59,037	98	Paved parking, HSG C
18,119	74	>75% Grass cover, Good, HSG C
77,418	98	Roofs, HSG C
157,728	95	Weighted Average
21,273		13.49% Pervious Area
136,455		86.51% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					Direct Entry,

**Subcatchment POST 2: Post Development Area 2**

Hydrograph



Runoff

**Type III 24-hr  
 100 YR Rainfall=7.00"  
 Runoff Area=157,728 sf  
 Runoff Volume=84,197 cf  
 Runoff Depth=6.41"  
 Tc=6.0 min  
 CN=95**

**Summary for Subcatchment POST 3: Post Development Area 3**

Runoff = 4.33 cfs @ 12.08 hrs, Volume= 14,144 cf, Depth= 5.71"

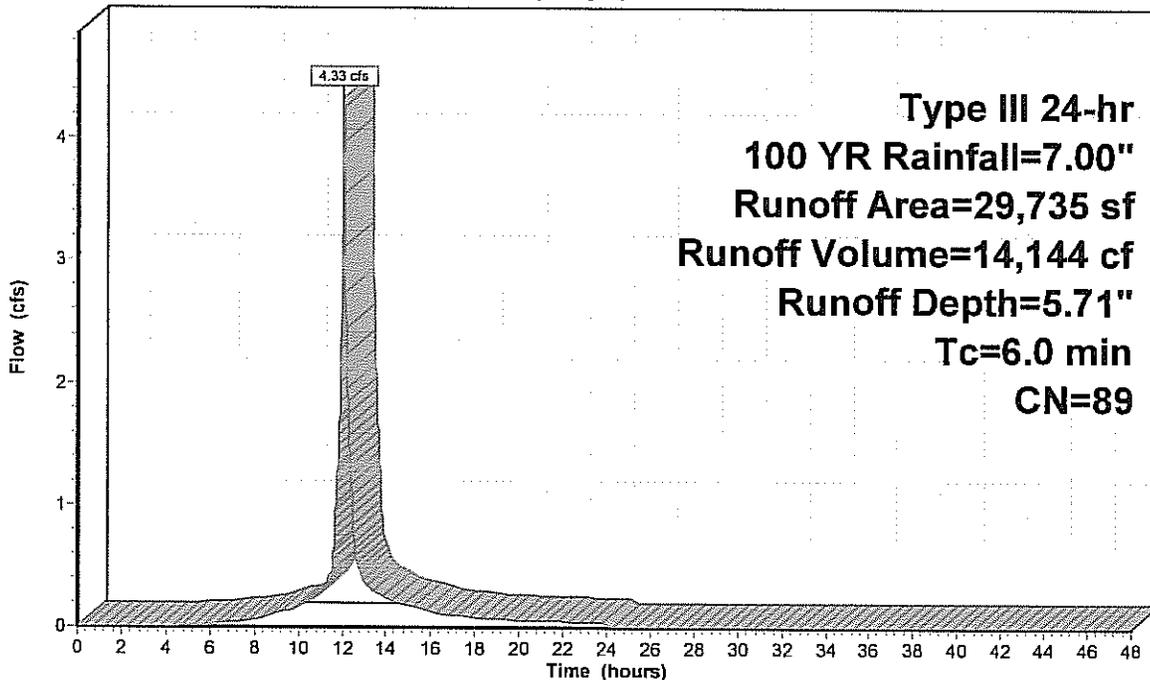
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.02 hrs  
 Type III 24-hr 100 YR Rainfall=7.00"

Area (sf)	CN	Description
18,773	98	Paved parking, HSG C
10,962	74	>75% Grass cover, Good, HSG C
29,735	89	Weighted Average
10,962		36.87% Pervious Area
18,773		63.13% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					Direct Entry,

**Subcatchment POST 3: Post Development Area 3**

Hydrograph



**1998-POST-WS**

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Type III 24-hr 100 YR Rainfall=7.00"

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**Summary for Subcatchment POST 3A: Post Development Area 3A**

Runoff = 5.93 cfs @ 12.09 hrs, Volume= 18,572 cf, Depth= 4.69"

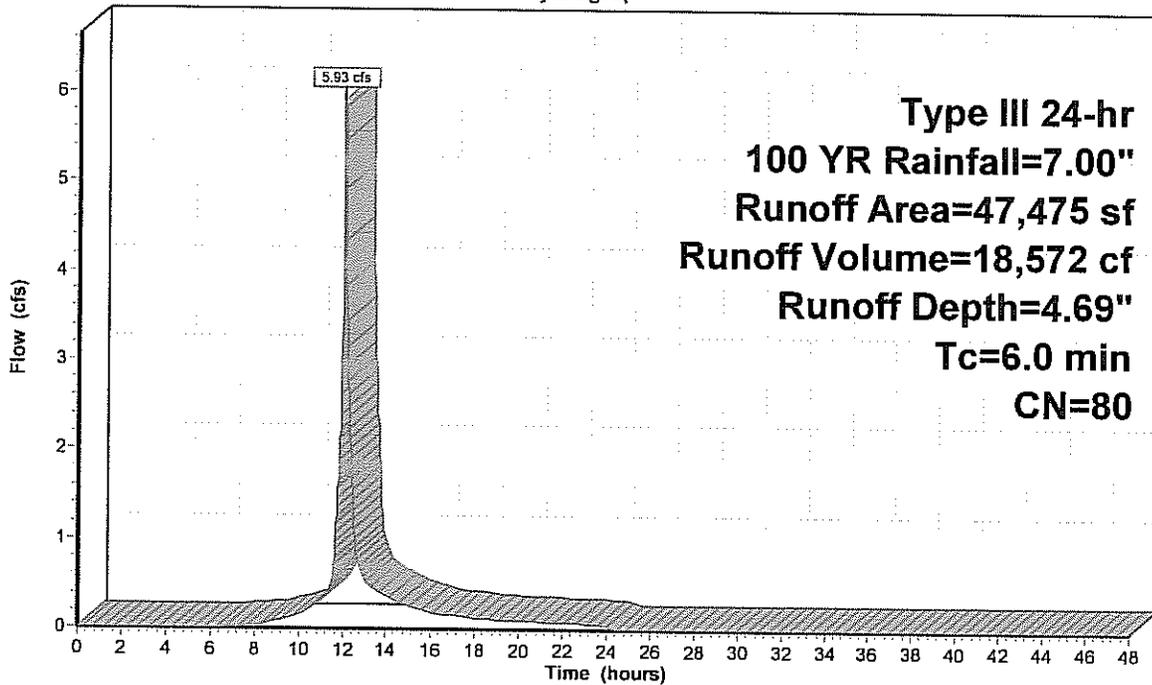
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.02 hrs  
Type III 24-hr 100 YR Rainfall=7.00"

Area (sf)	CN	Description
14,950	98	Roofs, HSG C
1,689	98	Paved parking, HSG C
30,836	70	Woods, Good, HSG C
47,475	80	Weighted Average
30,836		64.95% Pervious Area
16,639		35.05% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					Direct Entry,

**Subcatchment POST 3A: Post Development Area 3A**

Hydrograph



**Summary for Subcatchment POST 4: Post Development Area 4**

Runoff = 12.83 cfs @ 12.08 hrs, Volume= 44,193 cf, Depth= 6.41"

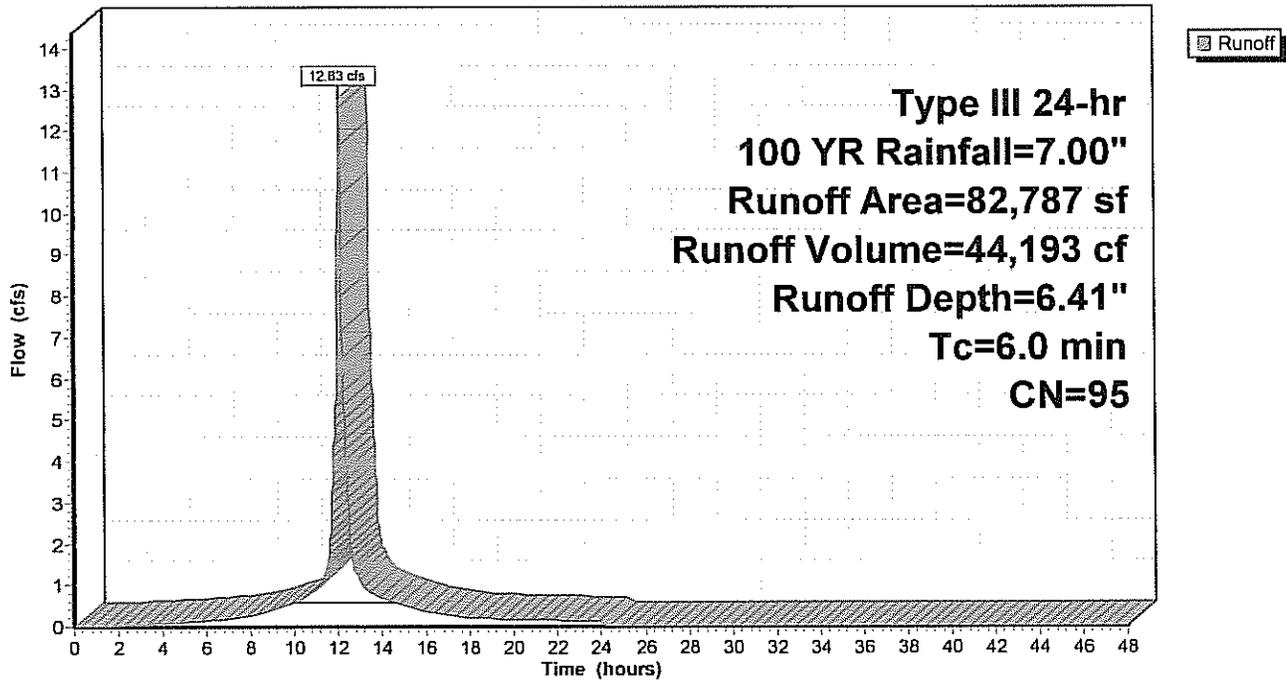
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.02 hrs  
 Type III 24-hr 100 YR Rainfall=7.00"

Area (sf)	CN	Description
70,785	98	Paved parking, HSG C
12,002	74	>75% Grass cover, Good, HSG C
82,787	95	Weighted Average
12,002		14.50% Pervious Area
70,785		85.50% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					Direct Entry,

**Subcatchment POST 4: Post Development Area 4**

Hydrograph



**Summary for Subcatchment POST 4A: Post Development Area 4A**

Runoff = 3.78 cfs @ 12.09 hrs, Volume= 11,729 cf, Depth= 3.94"

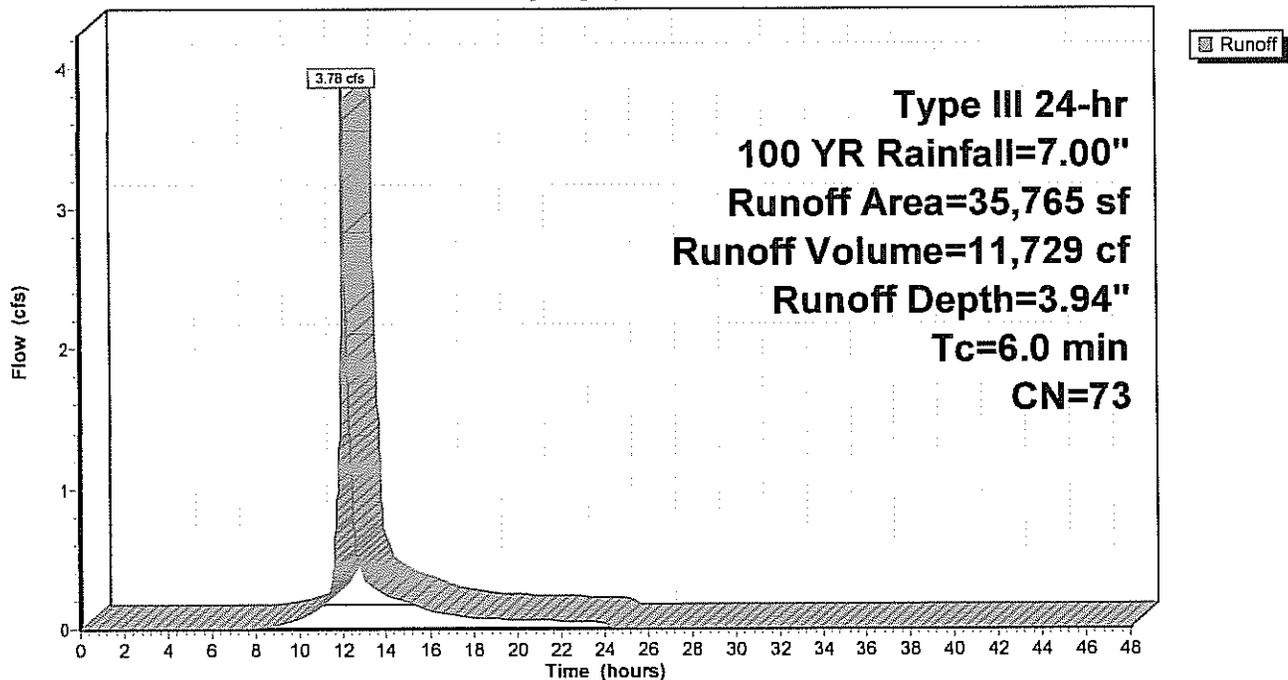
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.02 hrs  
 Type III 24-hr 100 YR Rainfall=7.00"

Area (sf)	CN	Description
32,116	70	Woods, Good, HSG C
3,649	98	Paved parking, HSG C
35,765	73	Weighted Average
32,116		89.80% Pervious Area
3,649		10.20% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					Direct Entry,

**Subcatchment POST 4A: Post Development Area 4A**

Hydrograph

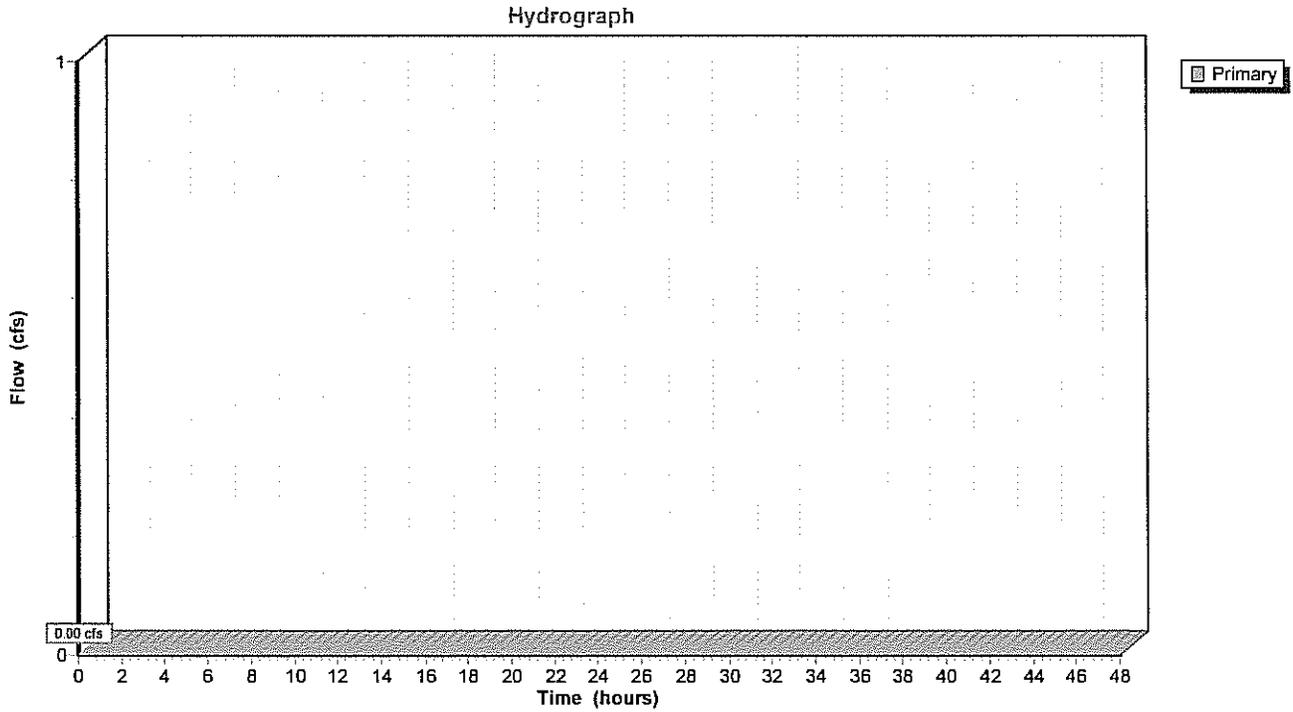


### Summary for Pond AP-1: WET-8 (No Flow)

[40] Hint: Not Described (Outflow=Inflow)

Primary OutFlow Max=0.00 cfs @ 0.00 hrs HW=0.00' TW=0.00' (Dynamic Tailwater)

### Pond AP-1: WET-8 (No Flow)



### Summary for Pond AP-2: WET-1

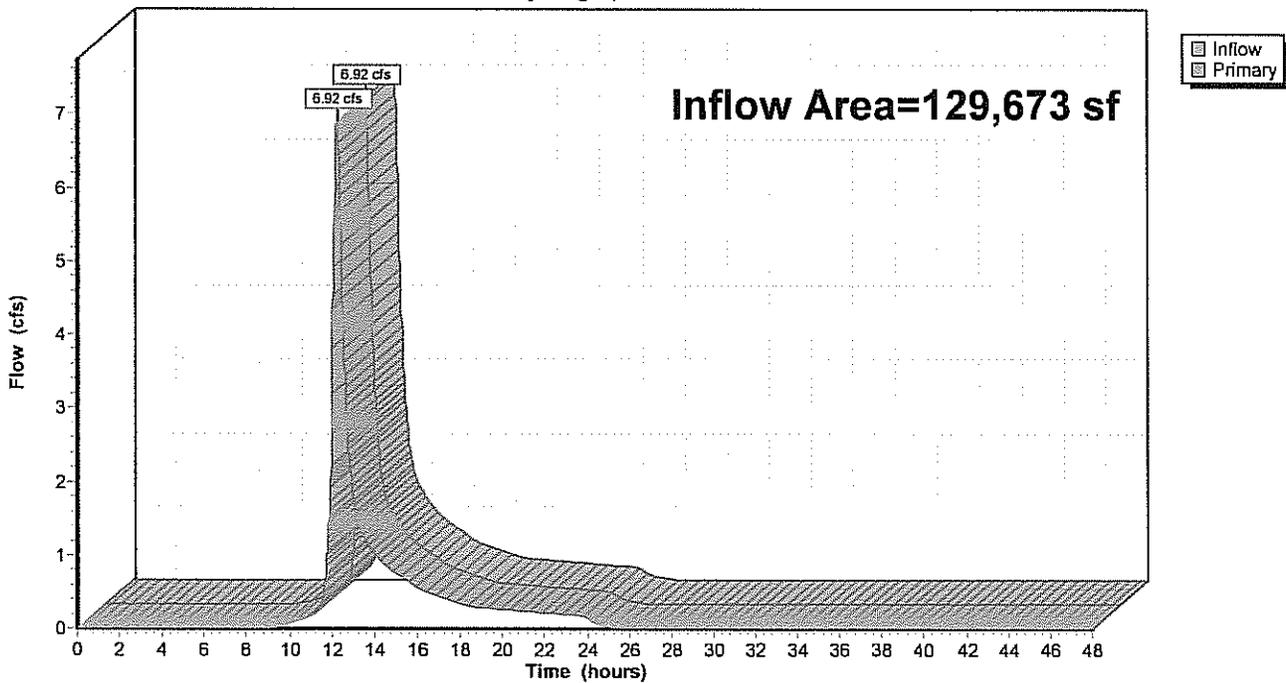
[40] Hint: Not Described (Outflow=Inflow)

Inflow Area = 129,673 sf, 2.72% Impervious, Inflow Depth = 3.43" for 100 YR event  
Inflow = 6.92 cfs @ 12.27 hrs, Volume= 37,104 cf  
Primary = 6.92 cfs @ 12.27 hrs, Volume= 37,104 cf, Atten= 0%, Lag= 0.0 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.02 hrs

### Pond AP-2: WET-1

Hydrograph



### Summary for Pond AP-3: Offsite-18"CMP

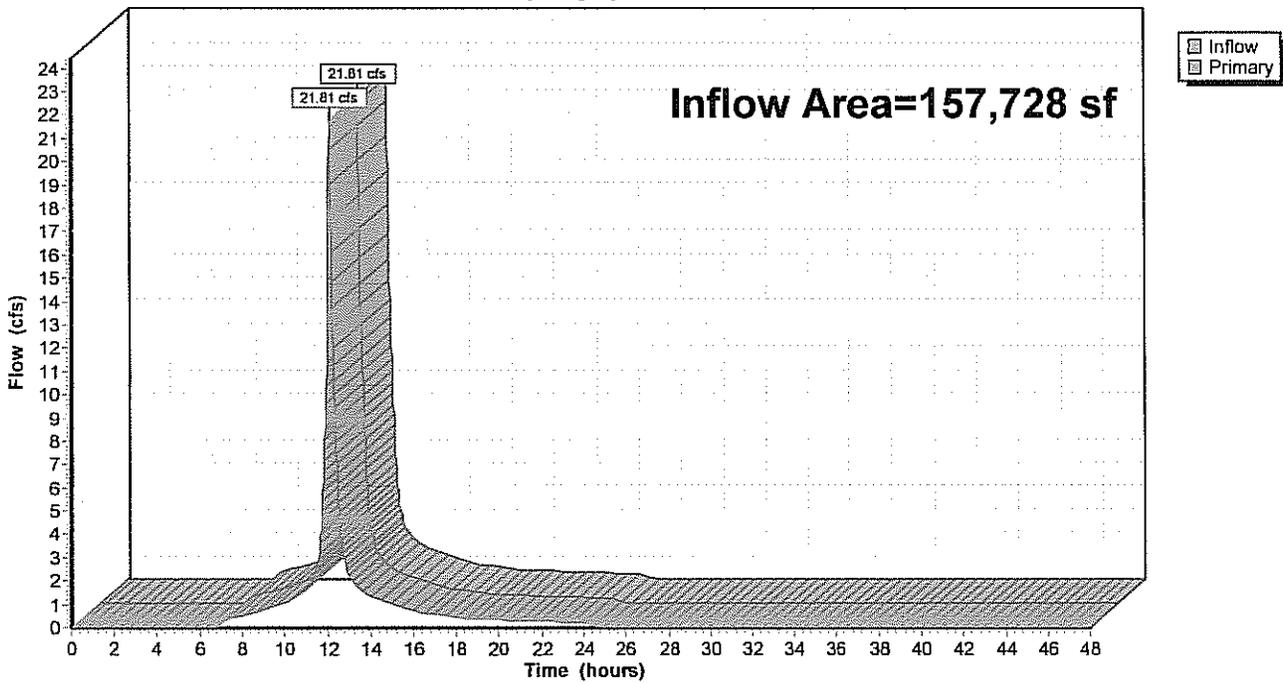
[40] Hint: Not Described (Outflow=Inflow)

Inflow Area = 157,728 sf, 86.51% Impervious, Inflow Depth = 6.17" for 100 YR event  
Inflow = 21.81 cfs @ 12.12 hrs, Volume= 81,084 cf  
Primary = 21.81 cfs @ 12.12 hrs, Volume= 81,084 cf, Atten= 0%, Lag= 0.0 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.02 hrs

### Pond AP-3: Offsite-18"CMP

Hydrograph



### Summary for Pond AP-4: WET-2

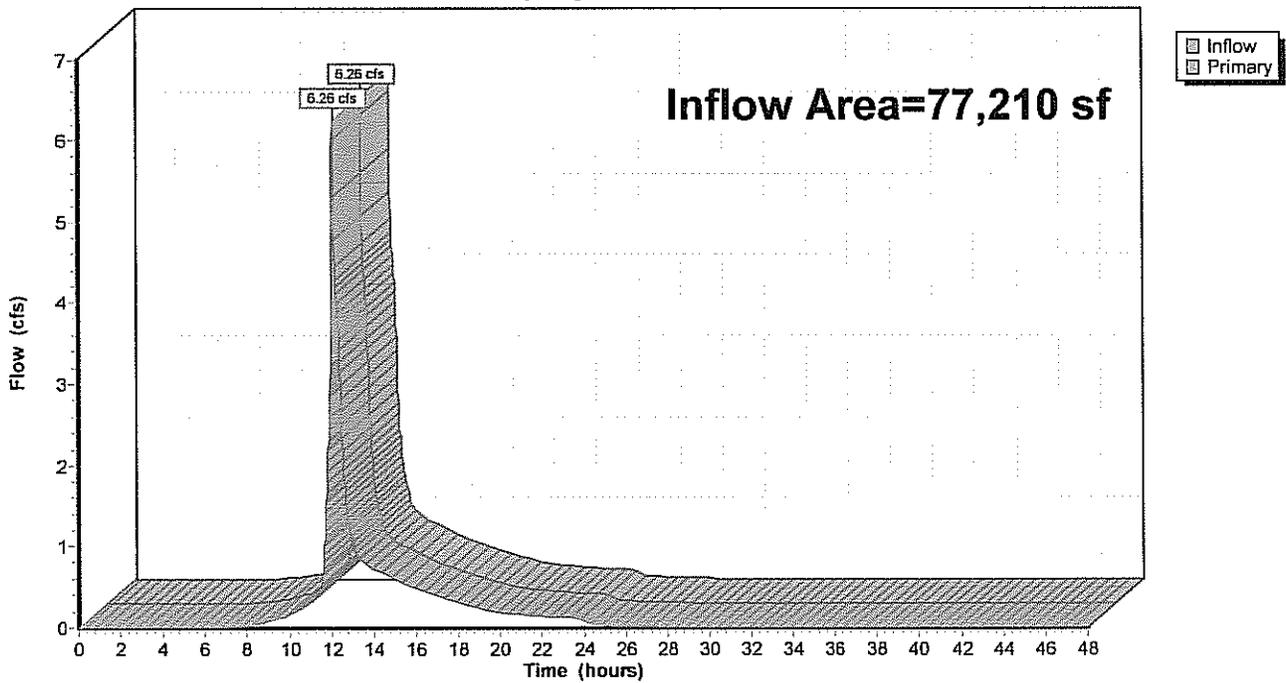
[40] Hint: Not Described (Outflow=Inflow)

Inflow Area = 77,210 sf, 45.86% Impervious, Inflow Depth = 4.69" for 100 YR event  
Inflow = 6.26 cfs @ 12.09 hrs, Volume= 30,178 cf  
Primary = 6.26 cfs @ 12.09 hrs, Volume= 30,178 cf, Atten= 0%, Lag= 0.0 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.02 hrs

### Pond AP-4: WET-2

Hydrograph



### Summary for Pond AP-5: WET-3

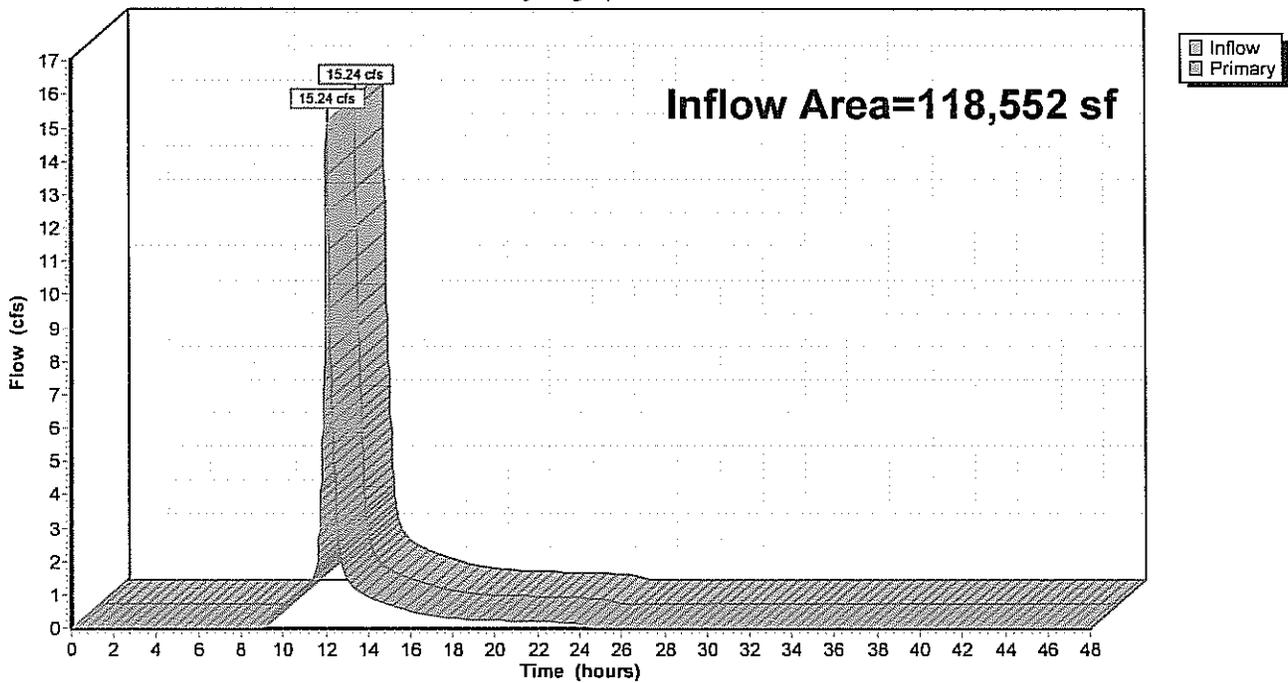
[40] Hint: Not Described (Outflow=Inflow)

Inflow Area = 118,552 sf, 62.79% Impervious, Inflow Depth = 5.20" for 100 YR event  
Inflow = 15.24 cfs @ 12.11 hrs, Volume= 51,415 cf  
Primary = 15.24 cfs @ 12.11 hrs, Volume= 51,415 cf, Atten= 0%, Lag= 0.0 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.02 hrs

### Pond AP-5: WET-3

Hydrograph



**Summary for Pond BASIN-1: BioRetention Area 1**

Inflow Area = 81,936 sf, 4.31% Impervious, Inflow Depth = 4.74" for 100 YR event  
 Inflow = 10.76 cfs @ 12.11 hrs, Volume= 32,362 cf  
 Outflow = 4.77 cfs @ 12.31 hrs, Volume= 22,710 cf, Atten= 56%, Lag= 12.0 min  
 Primary = 4.77 cfs @ 12.31 hrs, Volume= 22,710 cf

Routing by Dyn-Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.02 hrs  
 Peak Elev= 78.65' @ 12.31 hrs Surf.Area= 5,948 sf Storage= 12,505 cf  
 Flood Elev= 80.00' Surf.Area= 7,310 sf Storage= 21,444 cf

Plug-Flow detention time= 159.7 min calculated for 22,700 cf (70% of inflow)  
 Center-of-Mass det. time= 68.3 min ( 894.2 - 826.0 )

Volume	Invert	Avail.Storage	Storage Description
#1	76.00'	21,444 cf	Custom Stage Data (Prismatic) Listed below (Recalc)

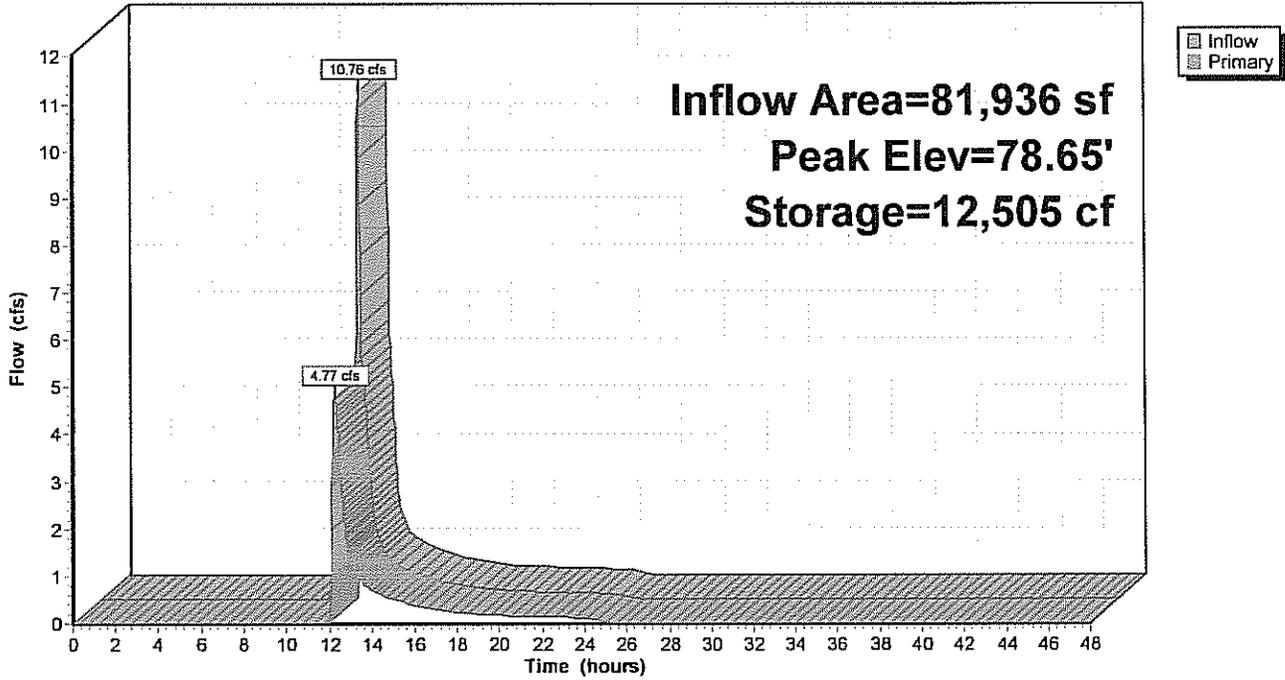
Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
76.00	3,553	0	0
77.00	4,407	3,980	3,980
78.00	5,319	4,863	8,843
79.00	6,286	5,803	14,646
80.00	7,310	6,798	21,444

Device	Routing	Invert	Outlet Devices
#1	Primary	78.15'	5.0' long x 25.0' breadth Broad-Crested Rectangular Weir Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 Coef. (English) 2.68 2.70 2.70 2.64 2.63 2.64 2.64 2.63

Primary OutFlow Max=4.77 cfs @ 12.31 hrs HW=78.65' TW=0.00' (Dynamic Tailwater)  
 ↑1=Broad-Crested Rectangular Weir (Weir Controls 4.77 cfs @ 1.91 fps)

### Pond BASIN-1: BioRetention Area 1

Hydrograph



**Summary for Pond BASIN-2: BioRetention Area 2**

Inflow Area = 157,728 sf, 86.51% Impervious, Inflow Depth = 6.41" for 100 YR event  
 Inflow = 24.45 cfs @ 12.08 hrs, Volume= 84,197 cf  
 Outflow = 21.81 cfs @ 12.12 hrs, Volume= 81,084 cf, Atten= 11%, Lag= 2.5 min  
 Primary = 21.81 cfs @ 12.12 hrs, Volume= 81,084 cf

Routing by Dyn-Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.02 hrs  
 Peak Elev= 77.69' @ 12.12 hrs Surf.Area= 4,316 sf Storage= 8,600 cf  
 Flood Elev= 78.00' Surf.Area= 4,425 sf Storage= 9,083 cf

Plug-Flow detention time= 47.8 min calculated for 81,050 cf (96% of inflow)  
 Center-of-Mass det. time= 25.7 min ( 785.7 - 760.0 )

Volume	Invert	Avail.Storage	Storage Description
#1	74.50'	9,083 cf	Custom Stage Data (Prismatic) Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
74.50	0	0	0
75.00	1,805	451	451
76.00	2,690	2,248	2,699
77.00	3,632	3,161	5,860
77.80	4,425	3,223	9,083

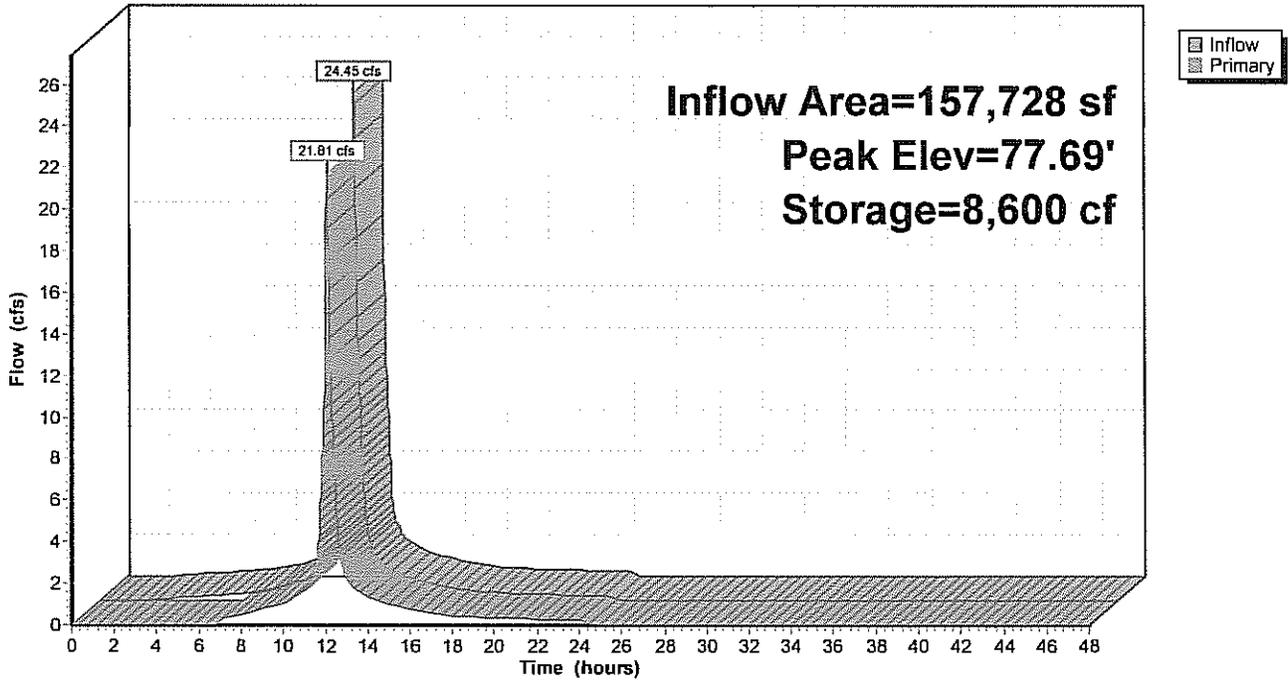
Device	Routing	Invert	Outlet Devices
#1	Primary	76.15'	<b>4.0' long x 2.0' breadth Broad-Crested Rectangular Weir</b> Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 3.00 3.50 Coef. (English) 2.54 2.61 2.61 2.60 2.66 2.70 2.77 2.89 2.88 2.85 3.07 3.20 3.32

**Primary OutFlow** Max=21.72 cfs @ 12.12 hrs HW=77.69' TW=0.00' (Dynamic Tailwater)

↑1=Broad-Crested Rectangular Weir (Weir Controls 21.72 cfs @ 3.53 fps)

### Pond BASIN-2: BioRetention Area 2

Hydrograph



**Summary for Pond BASIN-3: BioRetention Area 3**

Inflow Area = 29,735 sf, 63.13% Impervious, Inflow Depth = 5.33" for 100 YR event  
 Inflow = 4.28 cfs @ 12.10 hrs, Volume= 13,205 cf  
 Outflow = 1.54 cfs @ 12.36 hrs, Volume= 11,605 cf, Atten= 64%, Lag= 15.9 min  
 Primary = 1.54 cfs @ 12.36 hrs, Volume= 11,605 cf

Routing by Dyn-Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.02 hrs  
 Peak Elev= 76.69' @ 12.36 hrs Surf.Area= 4,139 sf Storage= 5,970 cf  
 Flood Elev= 78.00' Surf.Area= 5,167 sf Storage= 12,044 cf

Plug-Flow detention time= 194.9 min calculated for 11,600 cf (88% of inflow)  
 Center-of-Mass det. time= 140.9 min ( 948.3 - 807.4 )

Volume	Invert	Avail.Storage	Storage Description
#1	75.00'	12,044 cf	<b>Custom Stage Data (Prismatic) Listed below (Recalc)</b>
Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
75.00	2,938	0	0
76.00	3,624	3,281	3,281
77.00	4,367	3,996	7,277
78.00	5,167	4,767	12,044

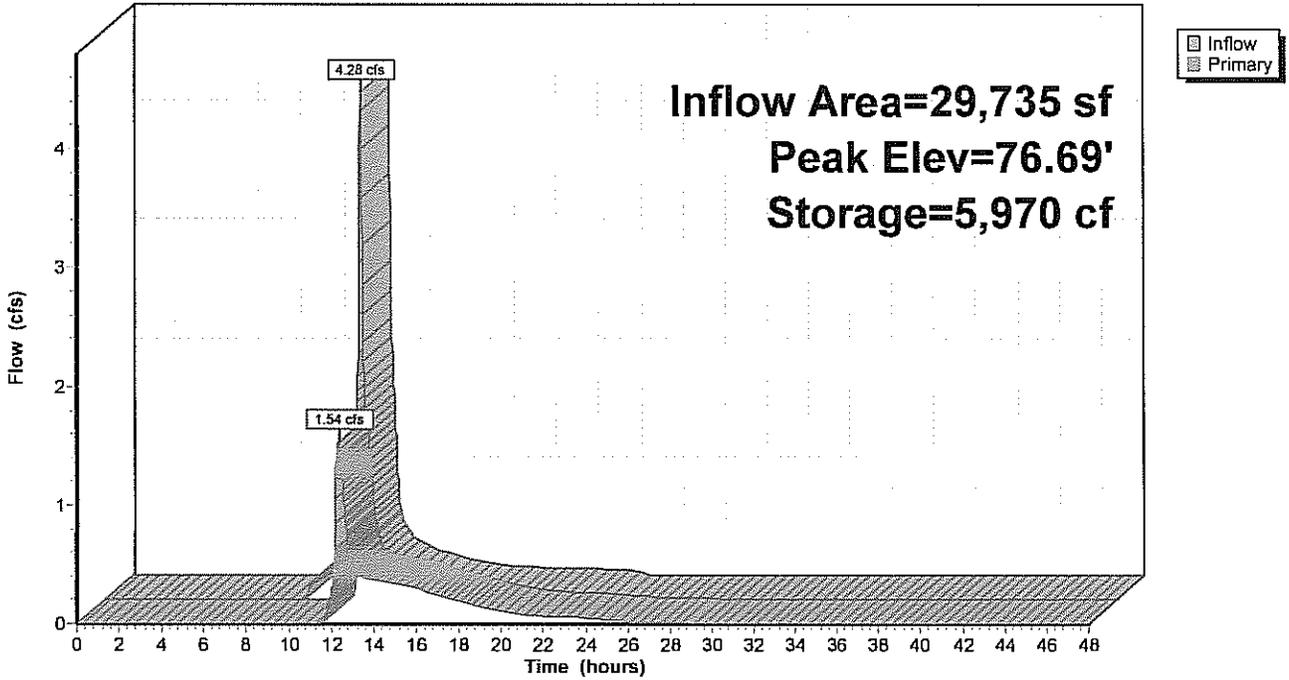
Device	Routing	Invert	Outlet Devices
#1	Primary	75.00'	<b>12.0" Round 12" HDPE</b> L= 30.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 75.00' / 74.80' S= 0.0067 '/' Cc= 0.900 n= 0.011 Concrete pipe, straight & clean, Flow Area= 0.79 sf
#2	Device 1	75.50'	<b>4.0" Vert. 4" Orifice</b> C= 0.600
#3	Device 1	76.50'	<b>4.0' long x 1.50' rise Sharp-Crested Rectangular Weir</b> 2 End Contraction(s) 1.5' Crest Height

**Primary OutFlow** Max=1.54 cfs @ 12.36 hrs HW=76.69' TW=0.00' (Dynamic Tailwater)

- ↑ 1=12" HDPE (Passes 1.54 cfs of 4.04 cfs potential flow)
- ↑ 2=4" Orifice (Orifice Controls 0.43 cfs @ 4.88 fps)
- ↑ 3=Sharp-Crested Rectangular Weir (Weir Controls 1.11 cfs @ 1.46 fps)

### Pond BASIN-3: BioRetention Area 3

Hydrograph



**Summary for Pond BASIN-4: BioRetention Area 4**

Inflow Area = 82,787 sf, 85.50% Impervious, Inflow Depth = 6.22" for 100 YR event  
 Inflow = 12.44 cfs @ 12.09 hrs, Volume= 42,919 cf  
 Outflow = 11.65 cfs @ 12.12 hrs, Volume= 39,686 cf, Atten= 6%, Lag= 2.0 min  
 Primary = 11.65 cfs @ 12.12 hrs, Volume= 39,686 cf

Routing by Dyn-Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.02 hrs  
 Peak Elev= 78.57' @ 12.12 hrs Surf.Area= 4,042 sf Storage= 5,425 cf  
 Flood Elev= 79.00' Surf.Area= 4,374 sf Storage= 7,218 cf

Plug-Flow detention time= 69.3 min calculated for 39,670 cf (92% of inflow)  
 Center-of-Mass det. time= 30.1 min ( 805.2 - 775.1 )

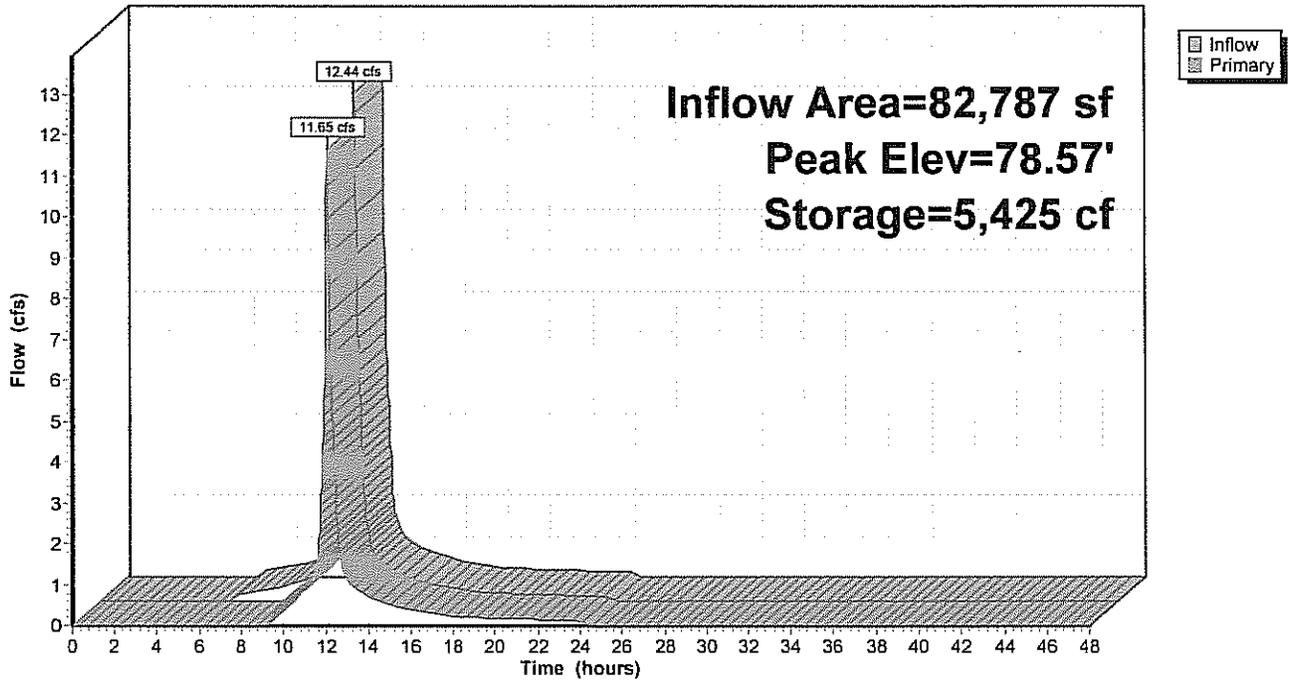
Volume	Invert	Avail.Storage	Storage Description
#1	77.00'	7,218 cf	Custom Stage Data (Prismatic) Listed below (Recalc)
Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
77.00	2,871	0	0
78.00	3,595	3,233	3,233
79.00	4,374	3,985	7,218

Device	Routing	Invert	Outlet Devices
#1	Primary	78.00'	<b>10.0' long x 8.0' breadth Broad-Crested Rectangular Weir</b> Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 3.00 3.50 4.00 4.50 5.00 5.50 Coef. (English) 2.43 2.54 2.70 2.69 2.68 2.68 2.66 2.64 2.64 2.64 2.65 2.65 2.66 2.66 2.68 2.70 2.74

Primary OutFlow Max=11.65 cfs @ 12.12 hrs HW=78.57' TW=0.00' (Dynamic Tailwater)  
 ↑1=Broad-Crested Rectangular Weir (Weir Controls 11.65 cfs @ 2.03 fps)

### Pond BASIN-4: BioRetention Area 4

Hydrograph



**Summary for Pond FB-1: Forebay**

Inflow Area = 81,936 sf, 4.31% Impervious, Inflow Depth = 5.25" for 100 YR event  
 Inflow = 11.25 cfs @ 12.09 hrs, Volume= 35,865 cf  
 Outflow = 10.76 cfs @ 12.11 hrs, Volume= 32,362 cf, Atten= 4%, Lag= 1.5 min  
 Primary = 10.76 cfs @ 12.11 hrs, Volume= 32,362 cf

Routing by Dyn-Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.02 hrs  
 Peak Elev= 78.95' @ 12.11 hrs Surf.Area= 2,951 sf Storage= 5,004 cf  
 Flood Elev= 79.00' Surf.Area= 2,991 sf Storage= 5,158 cf

Plug-Flow detention time= 78.4 min calculated for 32,348 cf (90% of inflow)  
 Center-of-Mass det. time= 30.9 min ( 826.0 - 795.1 )

Volume	Invert	Avail.Storage	Storage Description
#1	76.50'	5,158 cf	Custom Stage Data (Prismatic) Listed below (Recalc)
Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
76.50	1,200	0	0
77.00	1,518	680	680
78.00	2,227	1,873	2,552
78.50	2,602	1,207	3,759
79.00	2,991	1,398	5,158

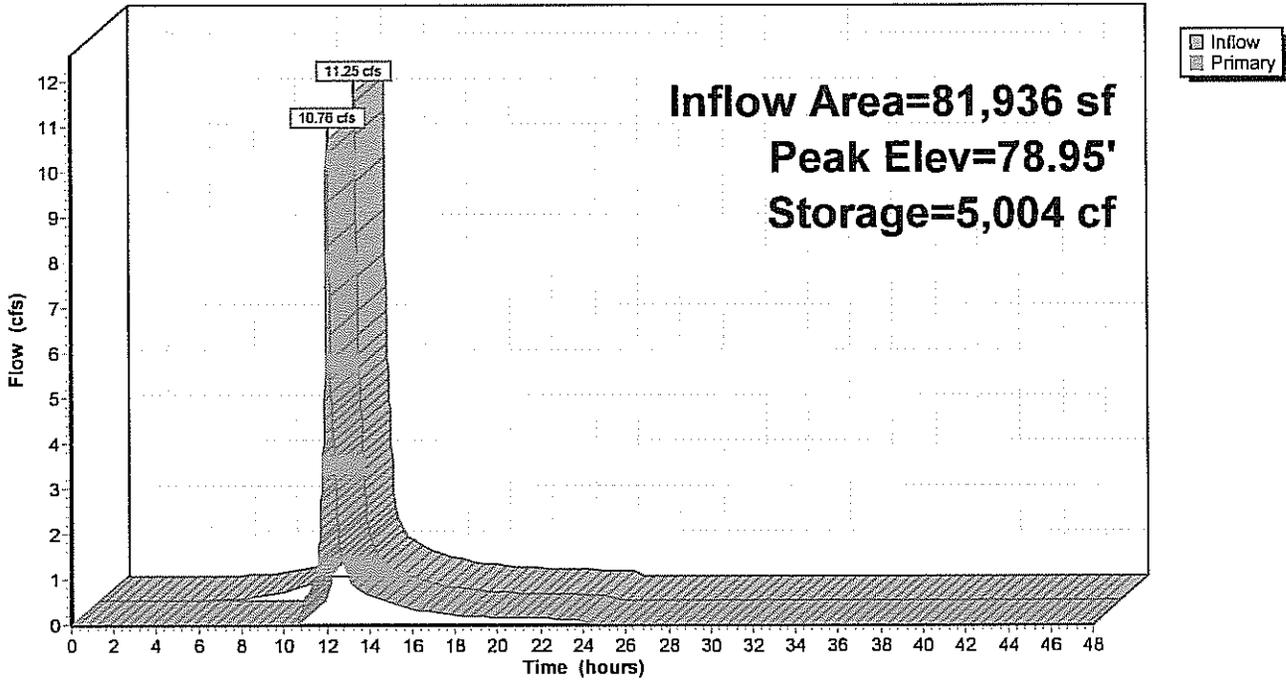
Device	Routing	Invert	Outlet Devices
#1	Primary	78.40'	<b>10.0' long x 6.0' breadth Broad-Crested Rectangular Weir</b> Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 3.00 3.50 4.00 4.50 5.00 5.50 Coef. (English) 2.37 2.51 2.70 2.68 2.68 2.67 2.65 2.65 2.65 2.65 2.66 2.66 2.67 2.69 2.72 2.76 2.83

Primary OutFlow Max=10.70 cfs @ 12.11 hrs HW=78.95' TW=78.13' (Dynamic Tailwater)

↑1=Broad-Crested Rectangular Weir (Weir Controls 10.70 cfs @ 1.96 fps)

### Pond FB-1: Forebay

Hydrograph



**Summary for Pond FB-2: Forebay**

Inflow Area = 29,735 sf, 63.13% Impervious, Inflow Depth = 5.71" for 100 YR event  
 Inflow = 4.33 cfs @ 12.08 hrs, Volume= 14,144 cf  
 Outflow = 4.28 cfs @ 12.10 hrs, Volume= 13,205 cf, Atten= 1%, Lag= 0.8 min  
 Primary = 4.28 cfs @ 12.10 hrs, Volume= 13,205 cf

Routing by Dyn-Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.02 hrs  
 Peak Elev= 76.91' @ 12.10 hrs Surf.Area= 952 sf Storage= 1,221 cf  
 Flood Elev= 77.00' Surf.Area= 982 sf Storage= 1,304 cf

Plug-Flow detention time= 59.9 min calculated for 13,205 cf (93% of inflow)  
 Center-of-Mass det. time= 24.2 min ( 807.4 - 783.2 )

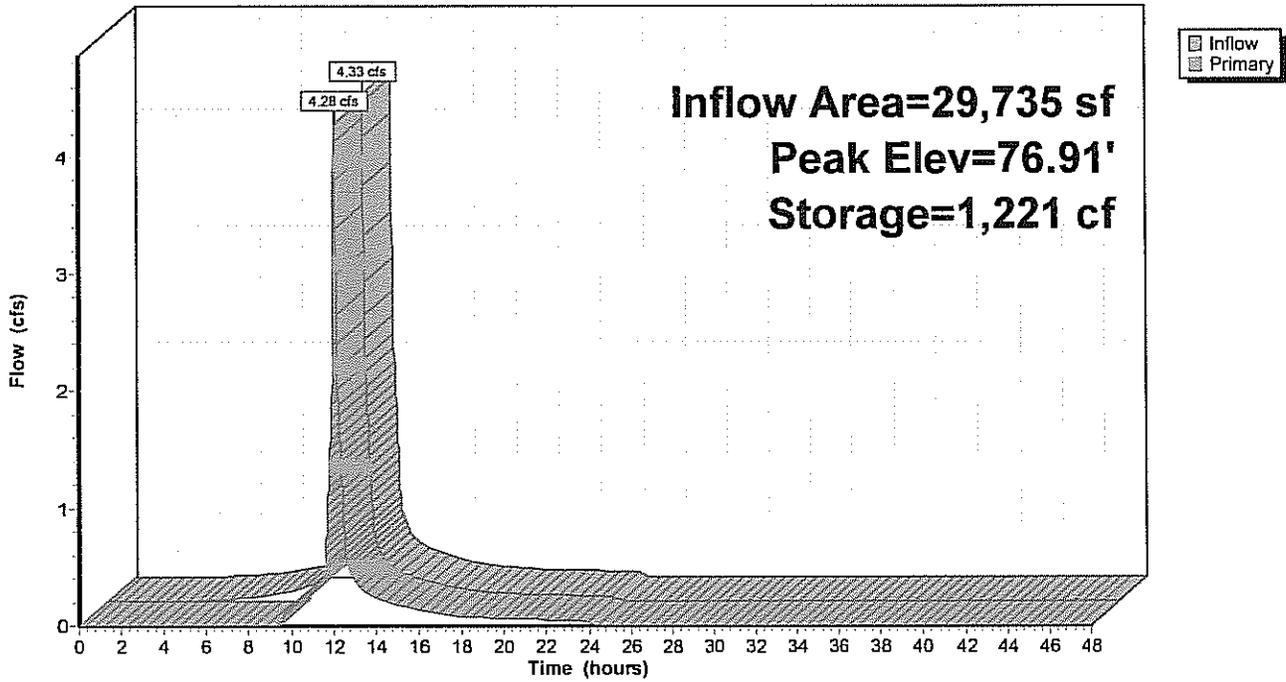
Volume	Invert	Avail.Storage	Storage Description
#1	75.00'	1,304 cf	Custom Stage Data (Prismatic) Listed below (Recalc)
Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
75.00	350	0	0
76.00	638	494	494
77.00	982	810	1,304

Device	Routing	Invert	Outlet Devices
#1	Primary	76.60'	<b>10.0' long x 5.0' breadth Broad-Crested Rectangular Weir</b> Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 3.00 3.50 4.00 4.50 5.00 5.50 Coef. (English) 2.34 2.50 2.70 2.68 2.68 2.66 2.65 2.65 2.65 2.65 2.67 2.66 2.68 2.70 2.74 2.79 2.88

Primary OutFlow Max=4.27 cfs @ 12.10 hrs HW=76.91' TW=76.32' (Dynamic Tailwater)  
 ↑1=Broad-Crested Rectangular Weir (Weir Controls 4.27 cfs @ 1.36 fps)

### Pond FB-2: Forebay

Hydrograph



**Summary for Pond FB-3: Forebay**

Inflow Area = 82,787 sf, 85.50% Impervious, Inflow Depth = 6.41" for 100 YR event  
 Inflow = 12.83 cfs @ 12.08 hrs, Volume= 44,193 cf  
 Outflow = 12.44 cfs @ 12.09 hrs, Volume= 42,919 cf, Atten= 3%, Lag= 0.3 min  
 Primary = 12.44 cfs @ 12.09 hrs, Volume= 42,919 cf

Routing by Dyn-Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.02 hrs  
 Peak Elev= 78.63' @ 12.12 hrs Surf.Area= 1,367 sf Storage= 1,699 cf  
 Flood Elev= 78.80' Surf.Area= 1,439 sf Storage= 1,941 cf

Plug-Flow detention time= 33.0 min calculated for 42,919 cf (97% of inflow)  
 Center-of-Mass det. time= 15.1 min ( 775.1 - 760.0 )

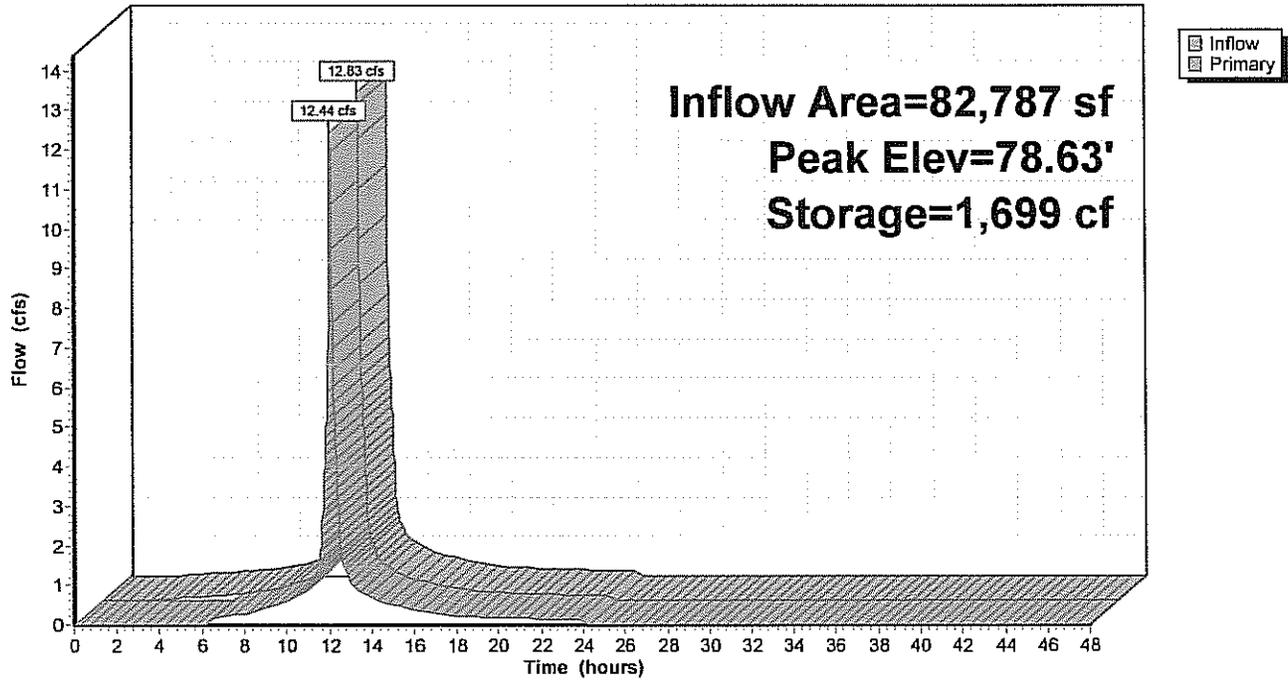
Volume	Invert	Avail.Storage	Storage Description
#1	77.00'	1,941 cf	<b>Custom Stage Data (Prismatic) Listed below (Recalc)</b>
Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
77.00	743	0	0
78.00	1,104	924	924
78.80	1,439	1,017	1,941

Device	Routing	Invert	Outlet Devices
#1	Primary	78.30'	<b>38.0' long x 1.0' breadth Broad-Crested Rectangular Weir</b> Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 3.00 Coef. (English) 2.69 2.72 2.75 2.85 2.98 3.08 3.20 3.28 3.31 3.30 3.31 3.32

**Primary OutFlow** Max=10.54 cfs @ 12.09 hrs HW=78.61' TW=78.55' (Dynamic Tailwater)  
 ↑1=**Broad-Crested Rectangular Weir** (Weir Controls 10.54 cfs @ 0.90 fps)

### Pond FB-3: Forebay

Hydrograph

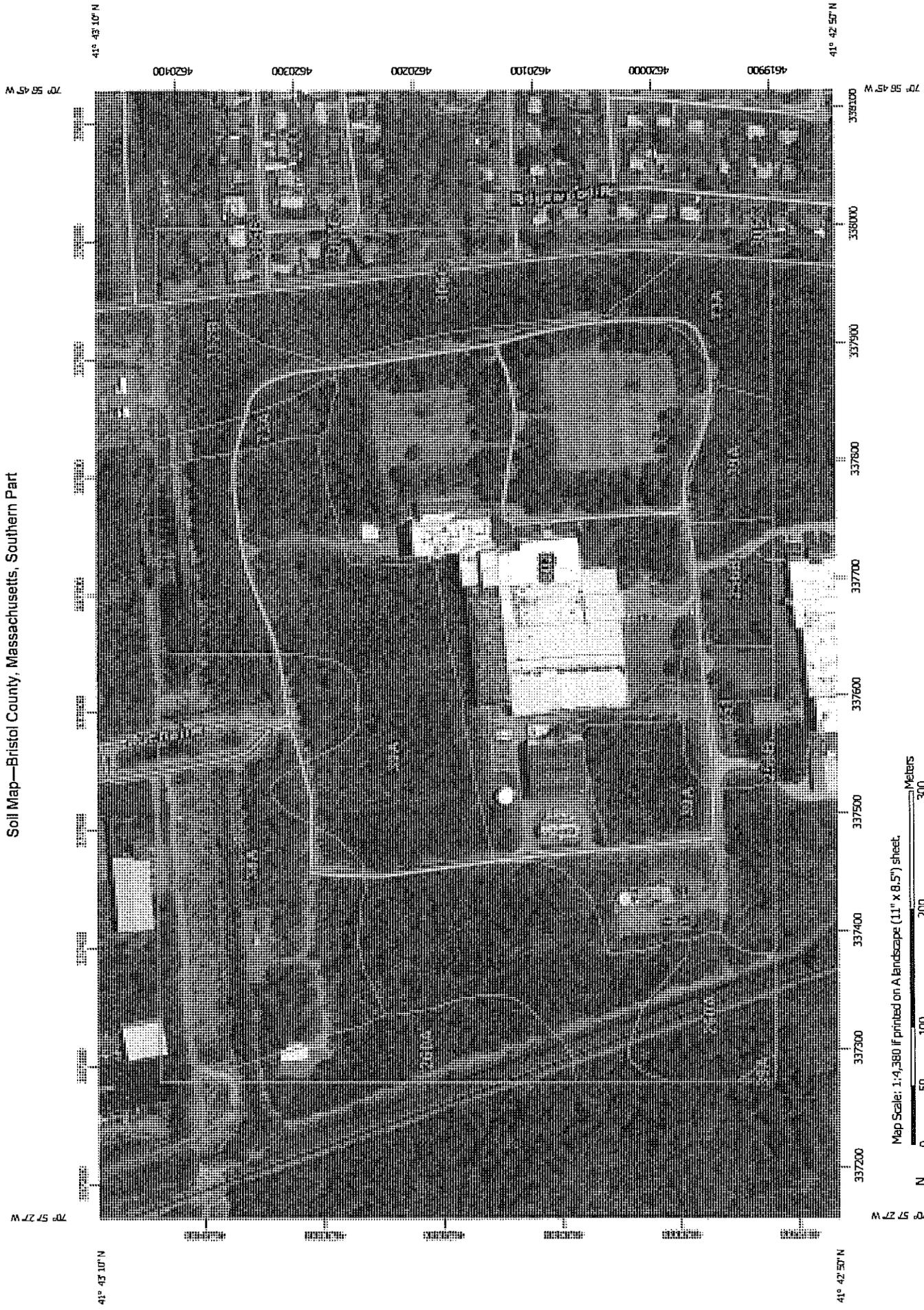


## *Section 4*

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### *Supplemental Data*

Soil Map—Bristol County, Massachusetts, Southern Part



Map Scale: 1:4,380 if printed on A landscape (11" x 8.5") sheet.



Map projection: Web Mercator Corner coordinates: WGS84 Edge tics: UTM Zone 19N WGS84

## MAP LEGEND

	Area of Interest (AOI)		Spoil Area
	Soils		Stony Spot
	Soil Map Unit Polygons		Very Stony Spot
	Soil Map Unit Lines		Wet Spot
	Soil Map Unit Points		Other
	Special Point Features		Special Line Features
	Blowout		Water Features
	Borrow Pit		Streams and Canals
	Clay Spot		Transportation
	Closed Depression		Ralls
	Gravel Pit		Interstate Highways
	Gravelly Spot		US Routes
	Landfill		Major Roads
	Lava Flow		Local Roads
	Marsh or swamp		Background
	Mine or Quarry		Aerial Photography
	Miscellaneous Water		
	Perennial Water		
	Rock Outcrop		
	Saline Spot		
	Sandy Spot		
	Severely Eroded Spot		
	Sinkhole		
	Slide or Slip		
	Sodic Spot		

## MAP INFORMATION

The soil surveys that comprise your AOI were mapped at 1:20,000.

**Warning:** Soil Map may not be valid at this scale.

Enlargement of maps beyond the scale of mapping can cause misunderstanding of the detail of mapping and accuracy of soil line placement. The maps do not show the small areas of contrasting soils that could have been shown at a more detailed scale.

Please rely on the bar scale on each map sheet for map measurements.

Source of Map: Natural Resources Conservation Service  
 Web Soil Survey URL: <http://websoilsurvey.nrcs.usda.gov>  
 Coordinate System: Web Mercator (EPSG:3857)

Maps from the Web Soil Survey are based on the Web Mercator projection, which preserves direction and shape but distorts distance and area. A projection that preserves area, such as the Albers equal-area conic projection, should be used if more accurate calculations of distance or area are required.

This product is generated from the USDA-NRCS certified data as of the version date(s) listed below.

Soil Survey Area: Bristol County, Massachusetts, Southern Part  
 Survey Area Data: Version 7, Dec 17, 2013

Soil map units are labeled (as space allows) for map scales 1:50,000 or larger.

Date(s) aerial images were photographed: Mar 30, 2011—Oct 8, 2011

The orthophoto or other base map on which the soil lines were compiled and digitized probably differs from the background imagery displayed on these maps. As a result, some minor shifting of map unit boundaries may be evident.

## Map Unit Legend

Bristol County, Massachusetts, Southern Part (MA603)			
Map Unit Symbol	Map Unit Name	Acres in AOI	Percent of AOI
38A	Pipestone loamy sand, 0 to 3 percent slopes	13.3	14.3%
39A	Scarboro muck, 0 to 1 percent slopes	26.7	28.7%
73A	Whitman fine sandy loam, 0 to 3 percent slopes, extremely stony	3.9	4.2%
256B	Deerfield loamy sand, 0 to 5 percent slopes	1.8	1.9%
260A	Sudbury fine sandy loam, 0 to 3 percent slopes	6.4	6.9%
305B	Paxton fine sandy loam, 3 to 8 percent slopes	0.3	0.4%
305C	Paxton fine sandy loam, 8 to 15 percent slopes	0.2	0.2%
306C	Paxton fine sandy loam, 8 to 15 percent slopes, very stony	7.6	8.2%
312B	Woodbridge fine sandy loam, 0 to 8 percent slopes, extremely stony	3.6	3.9%
602	Urban land	27.0	29.0%
651	Udorthents, smoothed	2.2	2.3%
<b>Totals for Area of Interest</b>		<b>93.0</b>	<b>100.0%</b>

FIELD ENGINEERING, INC.

MATTAPOISETT, MA

BASIN-1 WATER QUALITY VOLUME CALCULATIONS

Client: NWD, INC Job No. 1998  
Project: PROPOSED SITE DEVELOPMENT Date: 5/7/2014  
Location: 100 DUCHAINE BOULEVARD NEW BEDFORD, MA Design by: DANELL BAPTISTE

REQUIRED WATER QUALITY VOLUME BIORETENTION BASIN AND FOREBAY

UNIT VOLUME (in.) = 0.50  
\*IMPERVIOUS AREA (s.f.) = 3,516  
WATER QUALITY VOLUME (cu.ft.) = 147

AVAILABLE VOLUME CALCULATION

ELEV (ft.)	AREA (s.f.)	VOL (cu.ft.)	CUM. VOL (cu.ft.)	CUM. VOL (ac.ft.)
**	**			
0	**	0.0	0.0	0.000
76.0	3,553.0	0.0	0.0	0.000
77.0	5,926.0	4,739.5	4,739.5	0.109
78.00	7,545.0	6,735.5	11,475.0	0.263

WATER QUALITY VOLUME PROVIDED = 11,475.0 0.263  
WATER QUALITY VOLUME REQUIRED = 146.5 0.003 OK

\*EXCLUDING ROOF AREA

FIELD ENGINEERING, INC.

MATTAPOISETT, MA

BASIN-2 WATER QUALITY VOLUME CALCULATIONS

Client: NWD, INC Job No. 1998  
Project: PROPOSED SITE DEVELOPMENT Date: 5/7/2014  
Location: 100 DUCHAINE BOULEVARD NEW BEDFORD, MA Design by: DANELL BAPTISTE

REQUIRED WATER QUALITY VOLUME BIORETENTION BASIN AND FOREBAY

UNIT VOLUME (in.) = 0.50  
\*IMPERVIOUS AREA (s.f.) = 62,082  
WATER QUALITY VOLUME (cu.ft.) = 2,587

AVAILABLE VOLUME CALCULATION

ELEV (ft.)	AREA (s.f.)	VOL (cu.ft.)	CUM. VOL (cu.ft.)	CUM. VOL (ac.ft.)
**	**			
0	**	0.0	0.0	0.000
74.5	969.0	0.0	0.0	0.000
75.0	1,805.0	693.5	693.5	0.016
76.0	2,690.0	2,247.5	2,941.0	0.068

WATER QUALITY VOLUME PROVIDED = 2,941.0 0.068  
WATER QUALITY VOLUME REQUIRED = 2,586.8 0.059 OK

\*EXCLUDING ROOF AREA

## BASIN-3 WATER QUALITY VOLUME CALCULATIONS

Client: NWD, INC Job No. 1998  
 Project: PROPOSED SITE DEVELOPMENT Date: 5/7/2014  
 Location: 100 DUCHAINE BOULEVARD NEW BEDFORD, MA Design by: DANELL BAPTISTE

## REQUIRED WATER QUALITY VOLUME BIORETENTION BASIN AND FOREBAY

UNIT VOLUME (in.) = 0.50  
 \*IMPERVIOUS AREA (s.f.) = 18,773  
 WATER QUALITY VOLUME (cu.ft.) = 782

## AVAILABLE VOLUME CALCULATION

ELEV (ft.)	AREA (s.f.)	VOL (cu.ft.)	CUM. VOL (cu.ft.)	CUM. VOL (ac.ft.)
**	**			
0	**	0.0	0.0	0.000
75.0	3,367.0	0.0	0.0	0.000
76.0	638.0	2,002.5	2,002.5	0.046
76.60	840.0	443.4	2,445.9	0.056

WATER QUALITY VOLUME PROVIDED = 2,445.9 0.056  
 WATER QUALITY VOLUME REQUIRED = 782.2 0.018 OK

\*EXCLUDING ROOF AREA

## BASIN-4 WATER QUALITY VOLUME CALCULATIONS

Client: NWD, INC Job No. 1998  
 Project: PROPOSED SITE DEVELOPMENT Date: 5/7/2014  
 Location: 100 DUCHAINE BOULEVARD NEW BEDFORD, MA Design by: DANELL BAPTISTE

## REQUIRED WATER QUALITY VOLUME BIORETENTION BASIN AND FOREBAY

UNIT VOLUME (in.) = 0.50  
 \*IMPERVIOUS AREA (s.f.) = 70,785  
 WATER QUALITY VOLUME (cu.ft.) = 2,949

## AVAILABLE VOLUME CALCULATION

ELEV (ft.)	AREA (s.f.)	VOL (cu.ft.)	CUM. VOL (cu.ft.)	CUM. VOL (ac.ft.)
**	**			
0	**	0.0	0.0	0.000
77.0	2,500.0	0.0	0.0	0.000
78.0	3,403.0	2,951.5	2,951.5	0.068

WATER QUALITY VOLUME PROVIDED = 2,951.5 0.068  
 WATER QUALITY VOLUME REQUIRED = 2,949.4 0.068 OK

\*EXCLUDING ROOF AREA

## SEDIMENT FOREBAY-1 SIZING CALCULATION

Client: NWD, INC Job No. 1998  
 Project: PROPOSED SITE DEVELOPMENT Date: 5/7/2014  
 Location: 100 DUCHAINE BOULEVARD NEW BEDFORD, Design by: DANELL BAPTISTE

## REQUIRED SEDIMENT FOREBAY SIZING BIO-RETENTION BASIN

TOTAL CONTRIBUTING AREA (acre) = 1.88

MINIMUM FOREBAY SIZE (in. per acre) = 0.10

FOREBAY REQUIRED CAPACITY (cu. ft.) = 682

## AVAILABLE VOLUME CALCULATION

ELEV (ft.)	AREA (s.f.)	VOL (cu.ft.)	CUM. VOL (cu.ft.)	CUM. VOL (ac.ft.)
0	0.0	0.0	0.0	0.000
76.5	1,200.0	0.0	0.0	0.000
77.0	1,518.0	679.5	679.5	0.016
78.00	2,227.0	1,872.5	2,552.0	0.059

FOREBAY-1 VOLUME PROVIDED = 2,552 OK  
 TOTAL FOREBAY VOLUME REQUIRED = 682

## SEDIMENT FOREBAY-2 SIZING CALCULATION

Client: NWD, INC Job No. 1998  
 Project: PROPOSED SITE DEVELOPMENT Date: 5/7/2014  
 Location: 100 DUCHAINE BOULEVARD NEW BEDFORD, Design by: DANELL BAPTISTE

## REQUIRED SEDIMENT FOREBAY SIZING BIO-RETENTION BASIN

TOTAL CONTRIBUTING AREA (acre) = 1.87

MINIMUM FOREBAY SIZE (in. per acre) = 0.10

FOREBAY REQUIRED CAPACITY (cu. ft.) = 679

## AVAILABLE VOLUME CALCULATION

ELEV (ft.)	AREA (s.f.)	VOL (cu.ft.)	CUM. VOL (cu.ft.)	CUM. VOL (ac.ft.)
0	0.0	0.0	0.0	0.000
75.0	350.0	0.0	0.0	0.000
76.0	638.0	494.0	494.0	0.011
76.60	840.0	443.4	937.4	0.022

FOREBAY-2 VOLUME PROVIDED = 937 OK  
 TOTAL FOREBAY VOLUME REQUIRED = 679

## SEDIMENT FOREBAY-3 SIZING CALCULATION

Client: NWD, INC Job No. 1998  
 Project: PROPOSED SITE DEVELOPMENT Date: 5/7/2014  
 Location: 100 DUCHAINE BOULEVARD NEW BEDFORD, Design by: DANELL BAPTISTE

## REQUIRED SEDIMENT FOREBAY SIZING BIO-RETENTION BASIN

TOTAL CONTRIBUTING AREA (acre) = 1.87

MINIMUM FOREBAY SIZE (in. per acre) = 0.10

FOREBAY REQUIRED CAPACITY (cu. ft.) = 679

## AVAILABLE VOLUME CALCULATION

ELEV (ft.)	AREA (s.f.)	VOL (cu.ft.)	CUM. VOL (cu.ft.)	CUM. VOL (ac.ft.)
0	0.0	0.0	0.0	0.000
77.0	739.0	0.0	0.0	0.000
78.0	921.0	830.0	830.0	0.019
79.0	1,471.0	1,196.0	2,026.0	0.047

FOREBAY-3 VOLUME PROVIDED = 2,026 OK  
 TOTAL FOREBAY VOLUME REQUIRED = 679

**INSTRUCTIONS:**

1. In BMP Column, click on Blue Cell to Activate Drop Down Menu
2. Select BMP from Drop Down Menu
3. After BMP is selected, TSS Removal and other Columns are automatically completed.

**Location:** 100 DUCHAINE BOULEVARD NEW BEDFORD, MA

B	C	D	E	F
BMP <sup>1</sup>	TSS Removal Rate <sup>1</sup>	Starting TSS Load*	Amount Removed (C*D)	Remaining Load (D-E)
Deep Sump and Hooded Catch Basin	0.25	1.00	0.25	0.75
Bioretention Area	0.90	0.75	0.68	0.08
	0.00	0.08	0.00	0.08
	0.00	0.08	0.00	0.08
	0.00	0.08	0.00	0.08

Separate Form Needs to be Completed for Each Outlet or BMP Train

**Total TSS Removal =**

Project:	1998
Prepared By:	DTB
Date:	5/7/2014

\*Equals remaining load from previous BMP (E) which enters the BMP

**INSTRUCTIONS:**

1. In BMP Column, click on Blue Cell to Activate Drop Down Menu
2. Select BMP from Drop Down Menu
3. After BMP is selected, TSS Removal and other Columns are automatically completed.

**Location:** 100 DUCHAINE BOULEVARD NEW BEDFORD, MA

B	C	D	E	F
BMP <sup>1</sup>	TSS Removal Rate <sup>1</sup>	Starting TSS Load*	Amount Removed (C*D)	Remaining Load (D-E)
Sediment Forebay	0.25	1.00	0.25	0.75
Bioretention Area	0.90	0.75	0.68	0.08
	0.00	0.08	0.00	0.08
	0.00	0.08	0.00	0.08
	0.00	0.08	0.00	0.08

Separate Form Needs to be Completed for Each Outlet or BMP Train

**Total TSS Removal =**

Project:	1998
Prepared By:	DTB
Date:	5/7/2014

\*Equals remaining load from previous BMP (E) which enters the BMP

# *Appendix A*

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## *Pre and Post Development Watershed Plans*

## *Appendix B*

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### *Long Term Pollution Prevention Plan*

Long Term Pollution Prevention Plan  
LOGAL, LLC  
100 Duchaine Boulevard  
New Bedford, MA 02745

1.0 Introduction

This Long Term Pollution Prevention Plan has been prepared in accordance with the Massachusetts Stormwater Handbook for Compliance with Stormwater Standards 4-6.

2.0 Good Housekeeping Practices/Storage Provisions

Good housekeeping practices including periodic inspections of stormwater management system components will be performed in accordance with the Stormwater Management System Operation and Maintenance Plan. It is not anticipated that any high pollutant materials would be stored on site in areas that would discharge directly to the wetland systems. It would be anticipated that a property manager would be on-site and trained in the proper storage of materials and waste products on site.

3.0 Routine Maintenance of Stormwater BMP's

The Stormwater BMP's including the extended detention basins, sediment forebays, and grassed swales will all be operated and maintained in accordance with the Stormwater Management System Operation and Maintenance Plan which is discussed on the Site Development Plans.

4.0 Spill Prevention and Response Plans

Representatives of the property owner will be on site on a regular basis and will be trained in spill prevention and response. MSDS sheets are required to be on site for the handling of any chemicals or compounds that may be associated with any of the approved uses at the site. Emergency contact numbers will be posted and provided to any additional tenants that may occupy the building with a 24-hour contact number in the event of any spills on-site.

5.0 Landscaping Provisions

The landscaping on site will be maintained with generally accepted industry practices. Landscaping companies servicing the facility will be notified of the sensitivity of the wetland resource areas and stormwater management systems on site. Disposal of lawn and garden waste will be prohibited from any areas being used for stormwater management as well as in the wetland resource areas. Additionally, provisions shall be made to minimize the amount of fertilizers and other materials that will be allowed to be discharged within the landscaped areas on the site.

6.0 Pet Waste Management Provisions

It is not anticipated that there would be any pets on site at this commercial facility.

7.0 Provisions for Solid Waste Management

Dumpsters will be provided on-site for the disposal of solid waste. These dumpsters will be enclosed in fencing and emptied on a regular basis in accordance with Board of Health regulations and the Conditions of Site Plan Review approval.

8.0 Snow Disposal Guidelines

Plowing directly into the wetland resource areas will not be permitted. All snow stored on site will melt and flow through the stormwater management system.

9.0 Winter Road Salt and Sand Use

The use of road salt will not be allowed on the site. Sand will be used wherever possible. It is not anticipated that large quantities of road salt and/or sand will be stored on site.

#### 10.0 Street Sweeping Schedules

Sweeping of the parking lots will be performed at least once per year.

#### 11.0 Illicit Discharge Prevention

Illicit connections to the stormwater management system will be strictly prohibited. Any contractors performing work at the site will be notified of the prohibition of any illicit connections to the stormwater management system. All work done on site shall be per the approved design plans.

#### 12.0 Training for Staff

The property owner and their representative would be responsible for the operation and maintenance of the Stormwater Management System. Any Site Management Staff would be properly trained in the operation and maintenance of the Stormwater Management System.

#### 13.0 Emergency Contacts

The applicants of the project, LOGAL, LLC and the company operating out of the facility, NWD Inc., would be the emergency contacts for any implementation measures that may be required on this Long-Term Pollution Prevention Plan. It would be anticipated that emergency contact numbers would be posted throughout the site building and facilities should any situations arise.

## *Appendix C*

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### *Illicit Discharge Compliance Statement*

Illicit Discharge Compliance Statement  
LOGAL, LLC  
Proposed Site Improvements  
100 Duchaine Boulevard  
New Bedford, MA 02745

1.0 Description of Illicit Discharges

Illicit discharges are discharges to the stormwater management system that are not entirely composed of stormwater. Illicit discharges include (but are not limited to) wastewater discharges and discharges of stormwater contaminated by contact with process wastes, raw materials, toxic pollutants, hazardous substances, oil, or grease.

2.0 Illicit Discharge Prevention

The project, as designed, does not provide for any illicit connections to the proposed stormwater management system. As part of the long-term pollution prevention plan that will be on file at the City and with the Owners, illicit connections to the stormwater management system will be strictly prohibited. Any contractors performing work at the site will be notified of the prohibition of any illicit connections to the stormwater management system.

3.0 Training for Staff

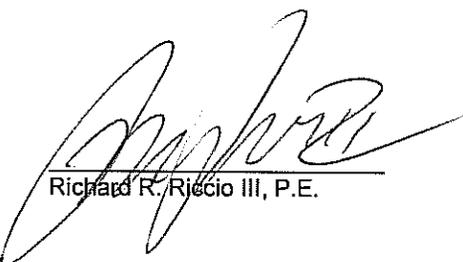
The property owners/developers responsible for the maintenance of the stormwater management system will be properly trained as required to detect any unauthorized illicit discharges to the stormwater management system and eliminate them as soon as possible. It is anticipated that staff will be performing routine maintenance on the stormwater management system and at this time would be able to detect any unauthorized illicit discharges.

4.0 Site Map

Refer to Proposed Site Development Plans prepared for LOGAL, LLC by Field Engineering for locations and information on the proposed stormwater management system associated with this project.

5.0 Certification

As the design plans show, there are no provisions for illicit discharges to the stormwater management system being proposed. Additionally, there are no proposed connections between any stormwater and wastewater management systems. Illicit discharges will be prohibited to the new stormwater management system associated with the proposed project and the property owners have been notified to not allow any unauthorized illicit discharges.



Richard R. Riccio III, P.E.